VOC-ship Amsterdam Monitoring Report 2016

Jerzy Gawronski, Ranjith Jayasena, Gideon Gijswijt, Chris Vastenhoud

The site of the Amsterdam at low tide, 13th March 2016

Amsterdam, March 2017
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Introduction

Since 2009 the Stichting VOC-schip Amsterdam (VOC-ship Amsterdam Foundation: VOCAF) organises a continuous monitoring programme of the site of the Dutch East Indiaman Amsterdam (1749) at Bulverhythe (Hastings). The goal of this programme is to gather information on on-site processes in relation to the state of conservation of this historical shipwreck. The core of the programme consists of regular webcam recordings of the site at low tide. In addition to the webcam recordings, once in a year one or two day on-site surveys during low tide are executed. After two campaigns in 2011 and 2013, a new survey was organised in 2016 between 11th and 14th of March.

The 2016 campaign took place during three consecutive low spring tide periods of approximately two hours each on Sunday 13th and Monday 14th of March. The survey team consisted of Dutch and English participants belonging to the Archaeological Institute (ACASA) of the University of Amsterdam (UvA), the Office for Monuments and Archaeology, city of Amsterdam (MenA) and the VOCAF (see Appendix 1). The project operated under a survey licence that was granted by the United Kingdom’s Department for Culture, Media and Sport in 2012.

1 Goals and methods

In 2009 the VOCAF developed a non-destructive destructive monitoring programme of the site of the East Indiaman Amsterdam at Hastings (Gawronska, Jayasena, Vastenhoud, 2009). The main objective was to establish a dataset for long-term assessment of the taphonomic site processes in relation to the ship’s remains. The monitoring programme of 2016 was directed to the following issues:

- Recording of separate sections of the hull and the exposed timbers to extend the integral plan of the site and the exposed wreck structure.
- Inspection of the condition of the site and the wreck, focusing on wood degradation and the stability of ship’s timbers, particularly in the upper part of the wreck which is exposed at low tide
- The progress and state of sedimentation processes on the site in relation to the condition of the ship structure.

2 Activities and results

2.1 Datum points and degradation of the timbers

The 2009 grid of datum points, consisting of 10 durable stainless steel screws with stainless steel horizontal tags (M1-M10), stayed still largely in place in the period 2013-2016 (Seinen, 2009), although some datum points show progressing decay, such as M6 (fig. 1). To assess the extent of wood degradation elevations were taken of some datum points and the wood surface underneath the tag (Appendix 2, table 1). These proved that the overall condition of the site had deteriorated compared to 2013. At datum points M2, M3, M4, M5, M8 and M10 a degradation between 2 and 5 cm was measured, with an average of 3.4 cm: compared with the situation in 2009-2013 (wood flush to datum tag) this means an average timber erosion of 0.5 cm per year (Appendix 2, table 2).
In order to maintain future insight in the progress of degradation of the ship’s structure, a set of new datum points was installed in 2016 to replace the eroded reference points from 2009. These consisted of sturdy inox bolts which were screwed in the upper parts of the structure (fig. 1, 2, 3: appendix 2, table 1). This time the head of the bolt was screwed in flush with the wood-surface. The degradation of the wood can be measured by the length of the shaft under the bolthead which will be exposed in the coming years as the wood is decaying.
Fig. 3. 1. M7 with inox bolt in hull plank to the right. 2. Bolt on top of bow. 3. Bolt in bow. 4. Bolt behind bow
Fig. 3. 5. Bolt next to lead drain pipe in starboard bow section. 6. Bolt in end of frame behind ceiling plank midship section starboard. 7. Bolt in frame in starboard midship section inside cofferdam. 8. Bolt in vertical pole in centre of wreck
Fig. 4 The exposed remains of the Amsterdam, March 13, 2016
The wreck structure was well exposed in 2016. Elevation measurements of the frame ends in relation to the beach level on starboard side proved a difference of 30 to 95 cm: on average the frames were exposed above the sand for 70 to 80 cm (Appendix 2, table 2). Inside the wreck on starboard side a scour pattern was observed: on three locations between 6 and 19 m from datum point M2 the level of sand behind the frames and ceiling planks inside the wreck was respectively between 25 and 55 cm lower than the beach level outside the wreck. This scouring pattern was also present the opposite inside section on port side, but not surveyed.

### 2.2 Site and ship structure plan

As during the 2016 survey the remains of the ship were exceptionally well exposed (fig. 4) the site plan of 2013 could be extended. In addition to the portside that had been largely mapped in 2013 the absence of sedimentation at the starboard side enabled detailed mapping of the sections between M1 and M9 and M8-M7 and M7-M3 (fig. 5).

All the exposed areas of the ship were mapped at scale 1:20. Each map included two of the 2009 datum points. Post-survey work included digitizing the analogue plans using AutoCAD. The individual maps were projected on the overall site plan, which had been produced by processing the measurements in DSM and exporting to a dxf file to allow further processing in AutoCAD. The measurements of 2016 were added to the survey plan of the bow section of 2009, 2011 and 2013 (fig. 5).
2.3 Overall site plan 1984-2016

The ship's structure mapped in 2016 was integrated in the overall site plan which was initiated in 2013 (Gawronski et al., 2014: 5, 9) (fig. 9). The basic overall site plan consists of a combination of the survey data of the 1984-1986 excavations (figs 6, 7) (Gawronski et al., 1985; Gawronski, 1986; 1987) and the low tide surveys in 2009-2013 (fig. 5). The 1980s grid of measuring points was related to the cofferdam around the ship's stern (fig. 6). Originally the survey grid included six steel girders, resting on the sheet piling, which divided the excavation area into seven sections (sections A-G). Also, in each grid section of the cofferdam, a datum point was fixed. At present, the latter are the only reference points left as the girders were removed in 1999. The cofferdam datum points have been linked to the present day datum points by DSM mapping during the 2013 survey (fig. 8).

Fig. 6  The 1984-1986 excavation grid at the stern of the ship
Fig. 7 Digitized site plan of the 1984 excavations

The overall site plan which shows almost the complete outline of the wreck was extended with the more detailed measurements of 2016 on the bow section (Fig. 9). More work is needed on the remaining ship structure on portside and starboard between 13 B and M10 respectively and the surveyed timbers of the 1980s excavation. These sections are more difficult to map during the monitoring campaigns as they generally remain underwater even during low spring tide. Progress depends entirely of the tidal situation and the exposure of the wreck.
Fig. 8 The calculated layout of all datum points of the 2013 survey related to the 1984-1986 grid, as well as all connecting lines. The green lines denote deviations of calculated versus measured distances of less than 2 cm, whereas the red lines denote deviations less than 4 cm. The average residual was 1.6 cm
Fig. 9 Integrated site plan of the 1984-2016 archaeological survey of the hull structure of the Amsterdam

VOC-ship Amsterdam (1749)
site plan

1984-1986 excavations
1996-2016 surveys
M1 datum point ship
MCo datum point cofferdam

bow
lower deck knees
upper deck knee
lead drain pipes

frames
lower gun deck beams
wings transom
base of gallery
counterframes
outer hull planking
ceiling plank
lodging knee
hanging knee
deck planking
counter frame
port lid
stem planking
stem post

0 m 1.0 m

VOC-ship Amsterdam Foundation

VOC-ship Amsterdam 2016 survey
2.4 Webcam monitoring

Since its installation in August 2009, the webcam has been used for structural recording, generating still pictures and video footage of the wreck site at low tides. The still image series consist of time lapse recordings at 12 second intervals at every low tide in which the site is exposed and visible (day light). In appendix 3 an overview of each recorded low tide in 2016 is shown. The camera monitoring was stopped in the November 2016, due to a change in the network settings at Hastings Diesels, where the camera is located.

The series of 2016 adds to a detailed dataset on the nature and extent of the site’s dynamic sedimentation process. The stills record possible seasonal changes of sand deposit levels and subsequent erosion or protection of (parts of) the wreck structure.

The overall conclusion is that the wreck structure was well exposed in 2016, with the timbers (frames, hull planks, lodging knees en ceiling planks) clearly visible in the bow to midship section on starboard and portside. In general, a slight seasonal fluctuation can be discerned: the structure seems more exposed in the beginning and the end of the year (e.g. March, October) and relatively more sand seems to be build up outside the wreck around the portside bow structure in the period April-September. Apart from gradual long term sand level fluctuation, there is also evidence for short term sand shift, even within 24 hours, as can be noticed comparing the morning and evening low tide on May 7th: during the evening tide not only the frames were exposed, but also the hull planking on portside bow was visible and not covered by sedimentation.

Link to the complete sequences:
3 Conclusions

The March 2016 survey had a twofold goal:

- Monitoring the beach situation with regard to sedimentation levels and wreck timber exposure and sand related erosion.
- Survey parts of the wreck structure for extending the overall site plan.

In general the wreck was well exposed in March: this level of exposure correlates with the outcome of the web cam stills that show an overall exposure of the wreck structure in the bow to midship section on starboard and portside throughout the year. In general, a slight seasonal fluctuation can be discerned on the stills series: the structure seems more exposed in the beginning and the end of the year (e.g. March, October) and relatively more sand seems to be build up outside the wreck around the portside bow structure in the period April-September. There is also evidence for short term sand shift, even within 24 hours, as can be noticed by the difference of exposure of the portside bow section on the morning and evening low tide on May 7th.

Elevation measurements of the frame ends in relation to the beach level on starboard side proved a difference of 30 to 95 cm: on average the frames were exposed above the sand for 70 tot 80 cm (Appendix 2, table 2). Inside the wreck on starboard side there were scour patches of 25 to 55 cm of depth, which means that the sand levels inside the wreck also vary.

The exposed timbers showed visible traces of teredo decay. To assess the extent of wood degradation elevations were taken of some datum points and the wood surface underneath the tag (Appendix 2, table 1). These proved that the overall condition of the site had deteriorated compared to 2013. At datum points M2, M3, M4, M5, M8 and M10 a degradation between 2 and 5 cm was measured, with an average of 3-4 cm: compared with the situation in 2009-2013 (wood flush to datum tag): this means an average timber erosion of 0.5 cm per year (Appendix 2, table 2). As a measure to continue further degradation monitoring, a set of new datum points – consisting of sturdy inox bolts – was installed in 2016 to replace some of the eroded 2009 reference points (figs 1-3).

The well exposed state of the timbers allowed detailed mapping of sections that had been (partly) covered by sediment during the previous campaigns. The 2016 survey provided more data on the starboard bow structure between M1 and M4 (fig. 5). The 2016 survey data was integrated in an overall site plan, consisting of both the 2009-2016 survey data and the 1984-1986 excavations (fig. 9). This was possible since the survey- and excavation grids were, by means of DSM mapping, integrated during the 2013 survey (fig. 8). More work is needed on the remaining ship structure on portside and starboard between 13 B and M10 respectively and the surveyed timbers of the 1980s excavations. These sections are more difficult to map during the monitoring campaigns as they generally remain underwater even during low spring tide. Progress depends entirely of the tidal situation and the exposure of the wreck.
4 References


Appendix 1 Participants survey 2016

Barak, Adrian. (Hastings, VOCAF)
Gawronska, Jerzy (VOCAF / Monuments & Archaeology, city of Amsterdam
Gijswijt, Gideon (VOCAF)
Jayasena, Ranjith (VOCAF / Monuments & Archaeology, city of Amsterdam
Rule, Nick
Symonds, James (ACASA, UvA)
Vastenhoud, Chris (Licensee, VOCAF)
# Appendix 2 Survey data

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<th>datum point</th>
<th>bow wood</th>
<th>frame end</th>
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<th>sand level inside wreck</th>
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Table 1: survey measurements of timbers and sand levels (elevation reference datum point M1 on the bow)
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Table 2: wood erosion frames, exposure of frames and depth of scour inside wreck on starboard side
Appendix 3 Web cam stills of low tides 2016

Overview of low tides 2016. See also http://cam.vocschip-amsterdam.org/download.php

- 2016-03-13 at 08:28
  (Hastings) Low tide 07:59 0.20 m
- 2016-03-14 at 09:11
  (Hastings) Low tide 09:20 0.76 m
- 2016-04-08 at 07:38
  (Hastings) Low tide 07:18 0.24 m
- 2016-04-08 at 19:31
  (Hastings) Low tide 19:35 0.30 m
2016-05-08 at 18:56
(Hastings) Low tide 07:40 0.28 m

2016-05-08 at 20:02
(Hastings) Low tide 19:58 0.33 m

2016-05-09 at 08:30
(Hastings) Low tide 08:26 0.33 m

2016-06-06 at 19:43
(Hastings) Low tide 19:42 0.50 m

2016-06-07 at 08:09
(Hastings) Low tide 08:12 0.55 m

2016-06-07 at 20:29
(Hastings) Low tide 19:29 0.52 m
2016-10-18 at 07:49
(Hastings) Low tide 07:49 0.55 m

2016-10-19 at 08:31
(Hastings) Low tide 08:31 0.59 m