Electronic Chart Systems – the portable approach

Paper given at the Safety at Sea ECDIS Conference

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Summary

This paper offers a new insight into PC-based ECDIS systems onboard and ashore. PC based ECDIS is often overlooked, yet it offers: -

- Flexibility and portability
- Ability to be updated easily
- Familiarity of a Microsoft Windows environment
- Cost-effective solution compared to IBS systems
- Low risk investment
- Ability to use email from the ECDIS PC for improved communication between ship and shore

Onshore, using electronic charts instead of paper charts: -

- Speeds up incident response times
- Gives managers a competitive edge when bidding, eg salvage operations where time is of the essence
- Allows managers to be in touch from any location in the world
- Standardises and speeds up Passage Plan preparation
- Allows fast chart delivery direct to PC via email
- Electronic charts installed on a single PC replace an entire paper chart cabinet

1.0 Introduction

We have, over the last few years, been inundated with conferences, papers and press reports regarding Electronic Chart Display Information Systems (ECDIS). ECDIS is defined as: -

> *"A navigation information system which with adequate backup arrangements can be accepted as complying with the up to date chart required by the regulation V/20 of the 1974 SOLAS convention by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning, route monitoring and by displaying additional navigation related information"[1].*

Charts used in ECDIS must be an Electronic Navigation Chart (ENC) or a Raster Navigation Chart (RNC). An ENC chart is a vector chart produced in content, format and structure to IHO S-57 Edition 3 specification and produced by or issued on the authority of a national hydrographic office. In the absence of an ENC chart, a RNC may be used but with paper chart back-up. The RNC must also be produced by a national hydrographic office or under the authority of a national hydrographic office, such as ARCS from the UK Hydrographic Office. If unofficial charts are used in an ECDIS, official paper charts must be used as the primary navigation system, even though the ECDIS itself may be Type Approved.

In the two years since the last Safety at Sea ECDIS Conference, the marketplace for ECDIS has moved on. Real benefits in installing ECDIS systems can be realised now, despite the following conditions in the marketplace: -

- Few ENCs are available.
- There is no worldwide standard for the paper chart back-up required. Flag authorities' views vary on this issue
- From PC Maritime's experience, there is a lack of understanding of ECDIS and all its implications

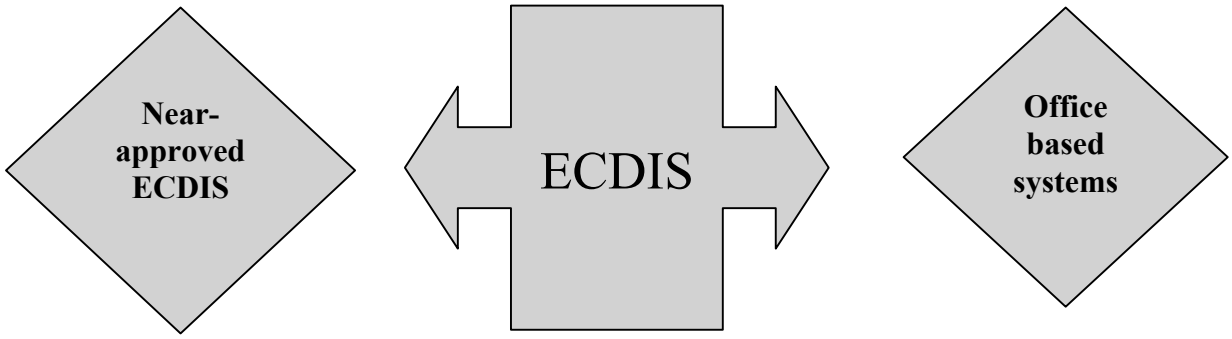
The purpose of this paper is to raise awareness and promote the benefits of:

- PC based ECDIS systems
- Near-approved ECDIS systems
- Office based electronic chart systems

[1] Maritime navigation and radiocommunication equipment and systems, Electronic chart display and information system (ECDIS) Operational and performance requirements, methods of testing and required test results BS EN 61174:1999, IEC 61174:1998

2.0 Background to ECDIS

Figure 1: Beyond ECDIS



2.1 Near-approved ECDIS

A number of manufacturers already have Type Approved ECDIS. However, very few ships are able to benefit from using ECDIS as their primary source of navigation. PC Maritime are approaching the development and approval of Navmaster ECDIS with a different philosophy to many manufacturers. Navmaster will be submitted for type approval but in no hurry, for the following reasons: -

- We gain flexibility in program development to allow for input from existing users, trials and new customers
- Our system can be tested in the field whilst at near ECDIS level to ensure the product meets the needs of the Mariner. This also results in greater product acceptance, since the user is making a vital input into development
- Shipping companies cannot fully benefit from Type Approved ECDIS, since paper charts must still be carried as the primary source of navigation in the absence of ENCs.

2.2 Office Based Systems

Using electronic charting systems in the office gives many benefits which will be detailed later in this paper.

> *"In the past and till today, many offices maintained a set of (sometimes uncorrected) paper charts to help them in such situations. These served their purpose fairly well and still do. However, with the advent of electronic charts, certain advantages began to manifest themselves, which I personally have found most helpful."*
>
> *Captain Antao, Head of Safety Group, Barber International*

3.0 PC Based ECDIS

3.1 Onboard

Onboard ships, whether deep-sea or coastal, a PC based chart system offers many benefits. The system also does not necessarily need to be ECDIS approved, depending upon the objectives of the ship owner and manager.

Users often perceive ECDIS to be large and expensive. However, PC based ECDIS offers: -

- Cost effectiveness compared to IBS systems
- Low risk investment
- Flexibility and portability (can be transferred from one ship to another)
- Ability for the system to be updated easily and inexpensively
- Easier adoption of ECDIS systems onboard through familiarity with PC's
- Ability to use email from the ECDIS PC for improved communication between ship and shore

3.1.1 Flexibility and Portability

Figure Two: Typical PC based installation

A PC based ECDIS implies the following: -

- Installation can be undertaken without interrupting the schedule of the vessel and allows for hands on training onboard
- System upgrades are easily applied without major disruption
- If a vessel is sold, the PC and associated software can be transferred to another vessel
- Software may be designed to the MS Windows standard interface, which reduces the learning curve
- Additional chart permits can be quickly emailed to the vessel
- Software maintenance is quick and easy to undertake, with technical support guidance via email
- Repeater monitors can be placed on the bridge for improved situational awareness. For example, one display at the conning position and on each bridge wing for manoeuvring

> *"One of the greatest advantages of the system is the ability to order new charts and receive permits from PC Maritime by email within two days of request. This has proved its worth on a number of occasions, as paper voyage charts are not always available from local suppliers."*
>
> *Captain Palmer, Master, Shell International*

3.2 Benefits of Using a Near Approved ECDIS

PC Maritime have worked closely with customers and potential customers in developing Navmaster Professional to meet their requirements,taking into account feedback from Masters and Superintendents in order to improve the system.

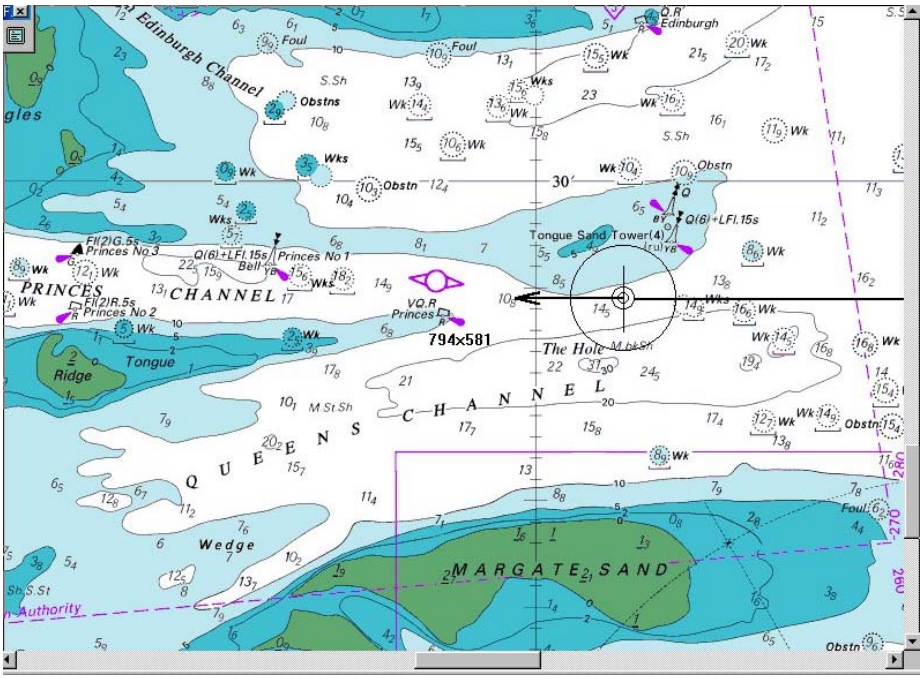
> *Initially, we bought the system to record ship's position, but the Masters are now finding it so good that they want to use more and more of Navmaster's capabilities.*
>
> *Captain Matthews, Marine Superintendent, Furness Withy*

3.2.1 Position Monitoring

Recording ship's position is widely held as one of the major benefits of an ECDIS system. This can be critical when approaching anchorages, pilot stations and in close waters. Repeater monitors on the bridge improve visibility of vessel position when berthing. On recent trials one Master, whilst entering a dock in fog, peered at his screen display through binoculars from the bridge wings to see whether he could/should move ahead! (The vessel has subsequently been fitted with repeater monitors.[2])

Figure Four: Real Time Position Plotting

[2] Trial with Euroship Services on Cobelfret ro-ro, April – June 2001



An electronic log can provide vital evidence if an incident should occur.

> *"We purchased Navmaster in order to determine and record vessel's position in Port Approaches following an incident in a UK Port. During post-incident investigations, we found it difficult to prove vessel's position; the paper chart log did not provide sufficient evidence. With Navmaster installed on a standard PC in the chartroom and a slave display monitor in the wheelhouse next to the radar, vessel's position is continuously plotted and recorded, and this information can be retrieved and exported easily to Head Office."*
>
> *Captain Matthews, Marine Superintendent, Furness Withy*

The log also allows the Master to review the OOW's track.

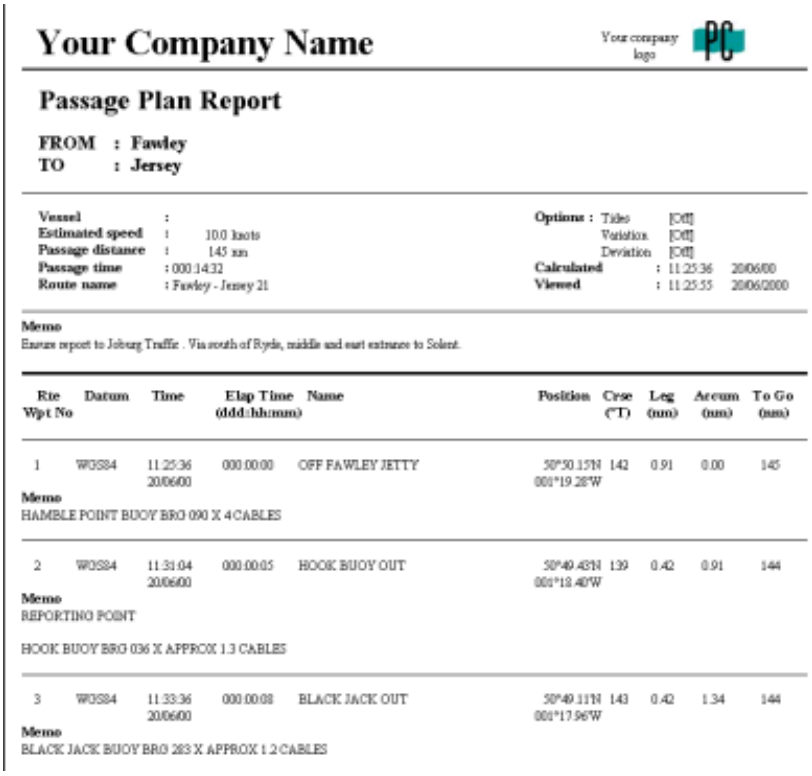
3.2.2 Passage Plan Preparation

The time taken to prepare passage plans can be greatly reduced. To ensure standard passage plans are produced, a company's logo can be added onto the passage plan.

> *"All passages are planned on Navmaster and the different routes saved to memory. This greatly reduces the time used for planning, especially when the vessel is on a regular trading pattern. Plans are printed off and entered into the full version of the current passage plan. Routes are overlaid onto charts in Navmaster and annotated with distances to go, then monitored by direct input from a stand-alone GPS."*

> *Captain Palmer, Master, Shell International*

Figure Five: Sample Passage Plan from within Navmaster Professional



Your Company Name

Your company logo

Passage Plan Report

FROM : Fawley
TO : Jersey

Vessel	:	**Options :** Tides	[Off]
Estimated speed	: 10.0 knots	Variation	[Off]
Passage distance	: 145 nm	Deviation	[Off]
Passage time	: 000 14:32	**Calculated**	: 11:25:36 20/06/00
Route name	: Fawley - Jersey 21	**Viewed**	: 11:25:55 20/06/2000

Memo
Enroute report to Joburg Traffic . Via south of Ryde, middle and east entrance to Solent.

Rte Wpt No	Datum	Time	Elap Time (ddd:hh:mm)	Name	Position	Crse (°T)	Leg (nm)	Accum (nm)	To Go (nm)
1	WGS84	11:25:36 20/06/00	000:00:00	OFF FAWLEY JETTY	50°50.15'N 001°19.28'W	142	0.91	0.00	145
Memo HAMBLE POINT BUOY BRG 090 X 4 CABLES									
2	WGS84	11:31:04 20/06/00	000:00:05	HOOK BUOY OUT	50°49.43'N 001°18.40'W	139	0.42	0.91	144
Memo REPORTING POINT HOOK BUOY BRG 036 X APPROX 1.3 CABLES									
3	WGS84	11:33:36 20/06/00	000:00:08	BLACK JACK OUT	50°49.11'N 001°17.96'W	143	0.42	1.34	144
Memo BLACK JACK BUOY BRG 283 X APPROX 1.2 CABLES									

3.3 Benefits of Office Based Electronic Chart Systems

PC Maritime have developed Navmaster Office as a management tool specifically designed for use onshore in situations where traditionally paper charts have been required.

Benefits of using electronic charts in the office: -

- Gives managers a competitive edge when handling incidents at sea
- Speeds up response times
- Provides flexibility and portability so that managers can be in touch from any location in the world
- Standardises and speeds up the preparation of passage plans
- Allows fast chart delivery direct to PC or laptop via email

- Electronic charts on a single PC replace an entire paper chart cabinet

3.3.1 Emergency Response

An office-based system gives the emergency response team the ability to respond quicker to an incident.

> *"Navmaster Office has enabled us to speed up the risk assessment when determining the dangers to a casualty and our own tugs, and assessing the appropriate contract to offer."*
>
> *Captain Hoddinott, Salvage Manager, United Salvage*

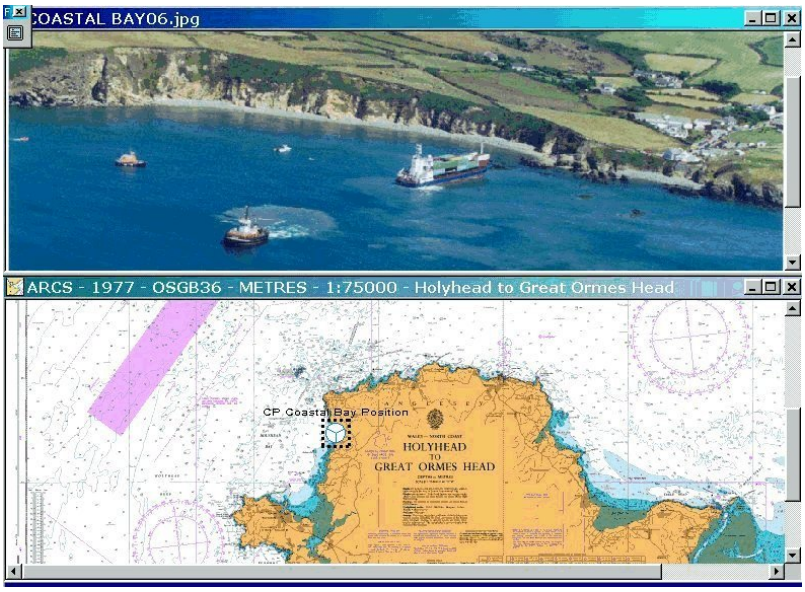
In the event of an emergency, quick access to charts is vital.

> *"When an emergency takes place on a ship at sea, almost the first support document needed by the response team is a navigational chart of the area. Up to now the MCA has maintained a set of paper charts to help us in emergency situations. With Navmaster Office and Admiralty electronic charts available in our Incident Room at Headquarters, we will have faster access to charts and be able to assess situations more quickly. Our Regional Officers will have Navmaster ready on their laptops, giving them the ability to plot incident position on the right Admiralty chart within minutes."*
>
> *Captain Garner, Head of Operations, Maritime & Coastguard Agency*

The manager in charge can respond from any location in the world. The use of laptops avoids the need to visit the office out of hours to locate a chart.

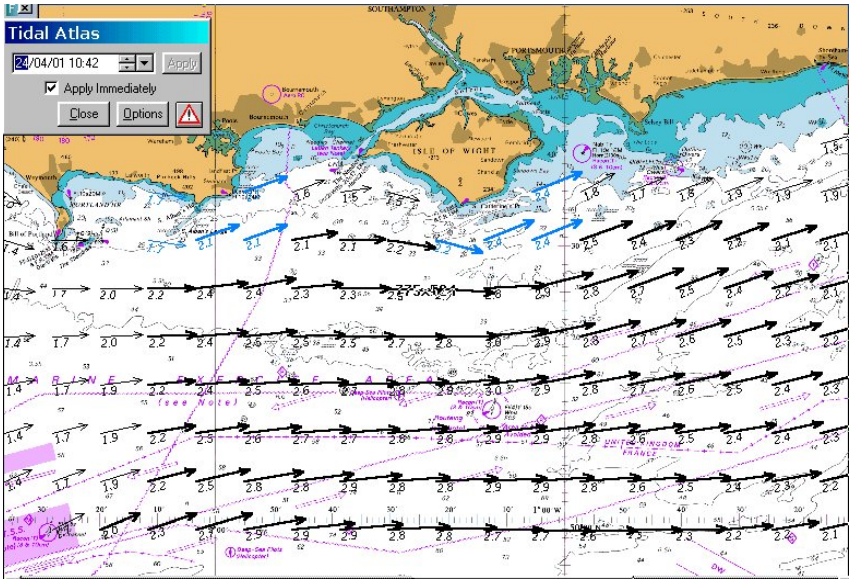
Communications with team members during the incident can be improved through the use of a network and the electronic chart can be viewed easily on a multimedia projector, rather than crowding round a paper chart. Tools such as the range and bearing tool make it easier to use the chart; there is no need for parallel rules or dividers. Other information can be attached to points on the chart; this can be in the form of photos or notes. In post incident reporting, this improves the visual presentation of the report.

Figure Five: Ability to attach photographs to positions on a chart



Tidal stream overlays assist the risk assessment process and help determine the right course of action. Tidal stream data on the chart can be projected ahead to help predict how a situation will develop over time.

Figure Six: Example of predicting tidal stream



During post incident investigation, Navmaster Office can be used to:

- Replicate incident position and attendant factors
- Provide colour chart print-outs for briefings
- Produce high quality reports

3.3.2 Route Planning

Using electronic charts for route planning reduces the amount of time needed to produce the required ISM berth to berth passage plans. Customisation of the passage plan is also available.

If the ship is using the same system as the office system, routes can be emailed from ship to shore.

Data can also be exported from within Navmaster Office to other Microsoft Applications for further analysis.

3.3.3 Risk Assessment

For port development, moorings management and cable laying, a risk assessment can be undertaken quickly using electronic charts.

Electronic charts can be shared across a network, ensuring easy access to the chart. Using electronic charts can enhance presentations

4.0 Conclusions

It is easy to become focused upon the high cost of IBS systems and the slow production of ENC's. No wonder that many ship operators have delayed making any decisions on ECDIS. Yet in today's cost-conscious climate, there are different options available now. It is time to consider fully the benefits that a PC based ECDIS offers over IBS or console systems and to start implementing the provision of ECDIS systems onboard. An electronic chart system used in an office offers considerable efficiency benefits over paper charts, leading to better use of senior personnel time.