Portable Pilot Units: improving safety and efficiency

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Though some models existed earlier, modern Portable Pilot Units (PPUs) have come on in leaps and bounds since the turn of the century. In that time there have been significant advancements in size, portability and functionality. While speed of setup is an important factor, an even more critical aspect that is often overlooked is the quality of the data being fed to the display.

In the same way that pilots provide high quality independent advice, so too should their personal equipment be independent of ship data. After all, if everyone bases their judgements on the same data, then safety and efficiency are compromised if it’s wrong.

This article looks at the development of Navicom Dynamics’ PPUs as well as some sample situations where PPUs were used to improve safety and/or efficiency.

High quality data
In order to accurately represent a scale image of a vessel on a computer screen, so that the image is a true reflection of reality, the most critical piece of data to be calculated is the heading of the vessel. Even if the GPS antenna on the vessel shows in the correct location (more or less accurately) on the screen, without heading the ship’s orientation will be random.

Navicom developed a unique portable GPS compass system that also included a rate of turn (ROT) gyro, tuned to give excellent stability at zero/low ROT as well as high sensitivity to rapidly detect the start of a turn. When combined with accurate DGPS position data this allowed for the position and movement of all parts of the ship to be shown accurately using suitable software.

The resulting product – at the time the smallest and lightest ‘full-function’ PPU in the world – was named ‘HarbourPilot™. The first system was supplied in December 2003, and other orders followed as HarbourPilot’s reputation spread. Pilots using HarbourPilot now had a lightweight, reliable PPU sensor, quick to set-up and easy to use, providing the pilot with:

- Familiar equipment over which they have total operational control – on every ship
- A wide range of software functionality depending on the display software in use. For example:
  - A real-time scale ship-image overlaid on the chart, based on the high quality data from the sensor
  - Height of tide correction
  - An invaluable aid to ship safety in poor visibility
  - Curved path prediction around bends
  - Docking assistance (to near laser-docking performance) at all berths
  - AIS target display with CPA functionality
  - Full recording and replay capability

Benefits
The benefits of using HarbourPilot quickly proved to be greater than anticipated – not just increasing the efficiency and safety of pilotage, but also providing considerable commercial benefits for ports. The following two examples demonstrate these commercial benefits:

- Safety - While piloting a Panamax bulk carrier into the Port of Weipa (Northern Queensland, Australia), and fully committed because of the narrow channel, a pilot was hit by a severe rain squall which lasted for over an hour. He had near-zero visibility for the rest of the passage – he couldn’t see the tugs or the beacons until they were abreast of the berth. Using the PPU (HarbourPilot) in conjunction with the radar, he was able to complete the inbound passage safely, catching the first glimpse of the berth when he was parallel and about 100 metres off
- Efficiency - At Cape Couvier, Western Australia, salt and gypsum are loaded onto bulk carriers lying just off the head of the loading jetty (which is not stressed for ship-contact) moored to six mooring buoys. The site is exposed to strong onshore winds during the day which often preclude berthing. Nights are generally much calmer, but the area is poorly lit. HarbourPilot was acquired to enable night movements – once experience had been gained by the pilots – and benefits began to flow almost immediately. Operations could begin in the late afternoon as the wind began to die, without having to worry that darkness might fall before completion. Additionally, the operation was much quicker, saving nearly an hour on each operation. Well before the planned night operations were attempted, the equipment had paid for itself from savings in demurrage

Other benefits
Navicom has also been involved in a number of projects where new port facilities were being constructed from scratch. Where ENCs are delayed in being produced, Navicom can produce S-57 chart cells of the critical areas from the customer’s engineering and survey data, for use with their PPUs. Some examples include: Torrevaldaliga, Italy; Port Hazira, India; and Barrow Island, Australia.
As an alternative to producing an S-57 cell, sometimes a similar effect can be created more simply by overlaying an engineer’s drawing of a new structure on top of the official ENC.

Hardware developments
Navicom pursues a policy of continuous improvement, always aiming to make smaller and lighter gear, while adding customer-inspired capability. For HarbourPilot, enhancements since the first model have included the addition of RTK reception capability and GLONASS. All units can also now have their own independent AIS receiver inside.

At the smaller end of the scale, AIS Pilot Plug devices remain in demand by some pilots and Navicom’s AISPlug will soon be replaced with a smaller more powerful unit that includes a gyro to provide independent ROT as well as a GPS receiver to give position when AIS reception is lost.

However, Navicom’s primary focus is on independence from ship data. For Pilots who require a high-level of independence but still need a small, lightweight sensor, Navicom introduced the ‘ChannelPilot™’ in 2012. This single compact unit provides smoothed heading and independent position, ROT and AIS reception direct to the pilot's display – removing the need for any connection to the pilot plug. ChannelPilot has proved extremely popular and is currently the company’s fastest selling product.

Other products
In addition to its products for use in ports and harbours, Navicom also produces customised sensors for multi-vessel offshore operations. ‘ShuttlePilot™’ enables a manoeuvring vessel and a moored FSO/FPSO to be displayed simultaneously, together with their respective headings and ROTs, relative distances and approach speeds, for both tandem and alongside operations. Used extensively at offshore oil and gas fields around the world, it is also used at Single Point Moorings (SPMs) and in South East Asia for transhipment operations between Vale’s 400,000 ton ‘Valemax’ iron ore carriers and Cape size ‘lighters’.

Support
Although new and improved equipment is very important, so are reliability and support. Navicom prides itself on both and regards high-quality support as key to customer satisfaction. The high volume of repeat orders is testimony to the success of this philosophy. Navicom’s PPUs and customised berthing aid systems have been tried and tested by marine pilots and mooring masters around the globe for over a decade now.

About the author
Paul Stanley BSc FNI is a former Navigation Specialist in the Royal Navy, and later, the Royal New Zealand Navy. He has a particular interest in pilotage and ship-handling, which he has both practised and taught to the highest levels. Paul has been actively involved in developing portable aids for marine pilotage since the late 1990s and he is currently a Director at Navicom Dynamics.

About the organisation
Navicom Dynamics are based in Auckland, New Zealand and are global specialists in precision orientation technology and monitoring systems. Navicom products are currently used in over twenty countries; whether a harbour pilot looking for a portable pilot unit, or an offshore industry company looking for a customised berthing aid system, Navicom cover all bases. They also provide precision GPS positioning solutions for bespoke projects - at sea and on land.

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