

The first Berthing Aid Systems were built in the early 1970's to cover the need for the increasing VLCC fleet. The technology was based on sonar that did not always operate satisfactorily due to failings on the under water sensors and turbulence in the water caused by the tugs. Ten years later, CW radar technology took over. It was an expensive technology that sometimes did not perform due to signal multipath. In 1989, Marimatech introduced the first laser-based technology and this principle has proved to be robust and reliable. In 2000, Marimatech introduced the first GPS based Berthing Aid System that could match the accuracy of the laser.

Where are we now?

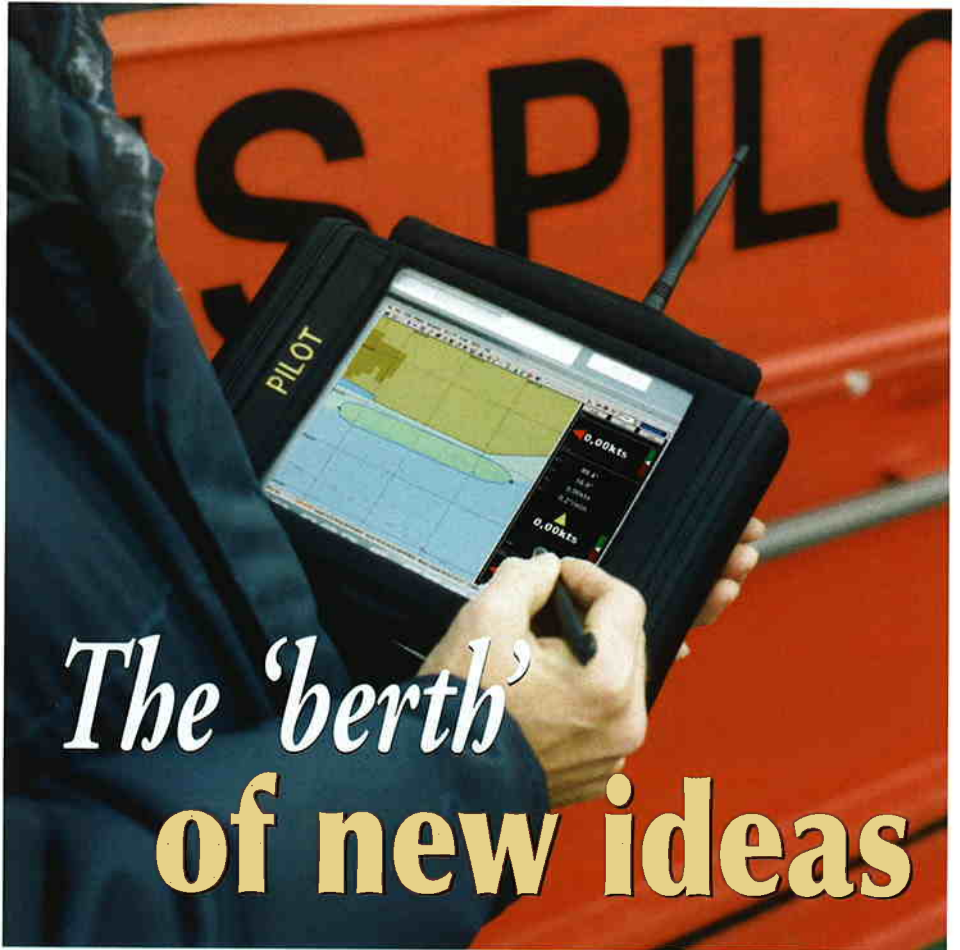
Today there are a total of 5 manufactures in this market that all have adopted the laser method. The Berthing System based on wireless GPS is still now in its implementation and we expect to see a few more players in this market segment. A total of 500 Berthing Aid Systems have been installed worldwide over the past 20 years. About 300 of these have been delivered by Marimatech and about 50 of these are now GPS based PPU's (Portable Pilot Unit), (Fig 1). The focus on safety and transportation efficiency will lead to increased need for these systems, but it will not be a fast process. As the opportunities are many in terms of integration with AIS and local VTS/VTMS systems, the decision process is slow and bureaucratic. Many large harbours looking into implementation of this new Berthing and Piloting Unit PPU also have to make decisions on how to use AIS and VTMS in an efficient way. They are taking the step-by-step approach to cater for future needs.

Expectations for the future?

As the opportunities are many for real time wireless transfer we will see a number of different solutions that will be driven by the local opportunities of established data network. Some harbours will go their own way and establish their own network to stay independent of public systems. Other harbours will take a step-by-step



Fig 2: A variety of solutions to meet different demands



The 'berth'
of new ideas

Fig 1: The Portable Pilot Unit

approach to get started and to get the experience before they go for the full-blown system. It is worth noting that when taking a big step the systems will become more complex to operate and could cause user resistance among the pilots. Different places will have different needs and therefore there will be different solutions to both software and hardware and so different levels of complexity. Newly developed hardware and software already offers solutions to almost any kind of piloting operation, (Fig 2). The next three years will see the development of special applications that will change the life of pilots and port operators. The reliability of the satellite systems, combined with affordable inertial systems that will assist GPS technology in difficult environments, will offer both accuracy and reliability to a level that will allow optimum operations. Precise manoeuvres based on valid prediction, bad weather operations, real time under keel measurements, and collision avoidance will all lead to increased safety and transportation efficiency. As well as pilot assisted operation, it is vital that navigators take AIS seriously both in practical use and integration into the ships radar and ECDIS in order to ensure a much higher level of safety in ships operation in confined waters and high-density traffic areas.

It will also require proper training of the navigators and an understanding from the ship owner that investment in AIS integration and training is a fast return of investment, (Fig 3).



Today, about 40 % of all AIS equipment is not properly installed or properly used. With the minimum keyboard the AIS is difficult to operate and the minimum display does not offer what is needed to have an operational overview. All this, combined with poor user understanding, is destroying the full benefit of this fantastic tool. It is difficult to understand why the insurance companies not are playing an important role in this AIS matter. A ship that has a properly installed AIS system with easy access to the pilot plug should receive a bonus in every pilot PPU assisted operation. The new technology PPU



Fig 4: Replacing more traditional systems by using GPS

and trained pilot will allow ships to be taken in and out of harbours in almost any condition. There is no doubt that the ship-owners will pay for this rather than staying on anchor. A safe and efficient harbour is important for ship-owners and the PPU will be a major investment towards efficiency and profit.

Replacing more traditional systems

The technology is available to change the principle. Instead of having shore based Berthing Aid Systems it would be more logical to have systems installed on ships. Permanent, installed GPS equipment designed for this purpose would be ideal as it can be used anywhere, (Fig 4). The first system of this kind is already available as a spin-off of the PPU concept (the Marimatech E-Sea Motion). This product enables the Captain to monitor and predict the ship's movements for berthing operations to the same accuracy as the laser system. Such a system will also be able to guide the ship with accuracy through critical turns with a prediction that always will be better than the most experienced navigator. Why are such systems not being implemented on all large vessels? – there does not seem to be a valid argument for not installing this new technology. Human error accounts for about 70% of all accidents. The cost of the amount of groundings, hard landings and collisions in one year could pay for the cost of installing this new technology in all new ships in the world over 20.000 DWT! To get this equipment on board would undoubtedly be the best return in investment. We know that most ship owners have “glue in their pockets”, but what about the insurance companies taking part or showing some interest? There could be a bonus to those ship owners who would install this kind of system. But it is not easy, just look



at how AIS is implemented. It is difficult to find a ship owner that has a clear policy regarding this technology. The most common is to do what is mandatory without looking too much at the result or benefit from the implementation. Another question is ownership of the recorded data. Where we have shore-based system the ship owner is of course the terminal owner. But several ships today have black-box recorders like in planes. The crews on board are getting used to this and realise that recorded accidents will have to be available for the parties involved. If there is motivation to substantially reduce the ‘human error’ accidents, the technology and the product are already available.

Development of mooring and fender systems

The classical system has been improved. Fenders of many types are now available and better design and improved materials are available to meet almost any requirements. The use of quick-release hooks is increasing and the hooks are also being improved in quality and functionality with integration of mooring load measurements and remote release. The hooks are much safer for the mooring crew and are less demanding in terms of manpower.



Many oil and gas terminals use monitoring of weather, waves and current as well fender deflection and mooring line loads to make sure that ships are safe and the terminal is not damaged. Entirely new methods seem far off in the future. The magnetic suction pad that will replace fenders and mooring systems is really a new thing that could improve the operations. This method that sounds crazy could one day be a revolution to the operations of several types of ships. Hydraulic mooring systems have been in operation for several years. There is no doubt that hydraulic systems also have a future for larger ships. If we take a look at the incident rate of berthing operations compared to the incident rate where the ship stays along side, the statistics show that there are more incidents along side. Therefore there is still a lot to be done to improve mooring operations. [12]