A crystal ball future

Predicting the future is never a precise science, so forecasting the future of electronic navigational equipment is never going to straightforward

At present there is nothing apparent that is going to revolutionise marine navigation in one go. But there is no doubt that with step-by-step evolution the time will come when vessels can safely navigate with little or no human intervention. Maybe the human will be banned from the bridge once the safety of autonomous systems exceeds those with human access!

Advances in track controllers will be steadily made, increasing the situations where manual steering is not required, eventually from departure to destination. Direct tie-up to weather and sea-state sensors and to micro-resolution weather forecasts can be expected.

The target detection capability of a marine radar has not substantially advanced in since the 1950s. The advances, which themselves are considerable, have been in their display of information, ARPA tracking capability, reliability and value for money. The present day detection performance of the marine radar is severely limited by the continued use of a magnetron as its RF power device. Magnetrons, invented during the Second World War, give very short pulses of high power microwave radiation at a very affordable cost.

Unfortunately there is a limit to what can be done to processing the returns from a magnetron pulse, whereas given more flexibility as to what the transmitted signal could consist of, improved target detection in clutter could be obtained. This follows the considerable advances in this area that have been made in military radars.

At present the pulse radar is effectively embedded in regulations as there are requirements for detection and display of signals from radar beacons and SARTs. However, because the pulses from a magnetron radar take up so much radio spectrum and create additional interference because of their very high power there is mounting pressure from the International Telecommunication Union (ITU) for something to be done to improve the situation.

Over the next 10 years there is likely to be some progress in this area and high detection capability solid state radars with low peak powers, maybe a few tens of watts or less should start appearing, (compared to magnetron peak powers of typically up to 25,000 watts). Detection from these combined with returns from universally adopted AIS would greatly improve a vessels collision avoidance capability.

In the same time frame we are going to see continued improvements in the intelligent merging of navigation data to give improved integrity of information. This will be aimed at informing the mariner when a real problem exists and to stop the proliferation of unhelpful alarms and warnings that the navigator has presently to contend with.

The existence of an accepted alternative/supplement to GPS, would greatly improve the integrity of position by using position data from both systems. Unfortunately the Russian GLONASS system has not been able to get this acceptance. Plans for the European Union's Galileo system are however still live and it is stated that an operational service will be available by 2008. This system has been designed as a non-military system and to be co-operable with GPS for the very reason of improving the integrity of position fixing.

Navigation is all about getting somewhere safely, but also affordably and on-time. Today's technology is good but clearly it still leaves room for accidents to happen. The future of navigation is all about reducing these, saving lives, protecting the environment and maybe even saving costs.