

## **DP TRENDS AND TRAITS – Dynamic Positioning**

New commercial markets, like cruise ships, have opened up for dynamic positioning control system suppliers; at the same time the level of safety and redundancy they provide has been increasing.

The traditional roles of dynamic position control systems are still valid markets. These are primarily off-shore vessels such as drilling units, particularly the latest breed of deepwater vessels. In recent years other off-shore vessel types have also started to utilise this technology, these newcomers include floating production vessels, shuttle tankers, anchor handlers, supply vessels, survey vessels etc.

Each of these sectors has recognised the benefits of DP technology to include precise position keeping, freedom from the restrictions of a mooring spread and the ability to move quickly from one location to another with a minimum of disruption. Couple this with the increasingly sophisticated track keeping capabilities of a modern DP system and the attractions are clear when considering a wide variety of vessel types and functions. The days when DP only meant 'stay on spot' are long behind us.

These same features are now attracting other 'non offshore' users. By far the biggest single market for DP over the last few years has been cable laying and cable repair vessels. The vast majority of the world's ocean-going cable ships are now fitted with sophisticated DP systems which feature modes and facilities which have been specially developed for the task. Track following facilities are of obvious benefit to cable ships, as are facilities which monitor tension in plough tow cables and control the ship accordingly.

Perhaps the biggest emerging market for DP systems is that for cruise ships. For several years these ships have been enjoying the benefits of joystick control systems which provide single lever control of position and heading via multiple thrusters, propellers and rudders. Every DP system includes a built-in joystick system plus all the benefits of DP. There are many benefits to cruise ships, for instance, having an alternative to dropping anchors in increasingly environmentally aware locations is a significant driver.

The simple truth is that any vessel which requires good station keeping or close track following facilities can benefit from DP. The functionality of the DP system can be tailored to meet operational requirements, as can the system configuration and content. By careful discussion on configuration and facilities between system supplier and user, suitable DP systems can be furnished at reasonable cost, hence DP technology is becoming available to a broader audience. The days of the dynamically positioned, privately owned, ocean-going yacht are here.

### **Technology Trends**

In common with other technology based subjects it is too easy to forget that the technology is simply to enable through which a number of practical tasks may be performed and solutions to problems may be found.

The hardware platforms on which modern DP systems are built bear little resemblance to the hardware platforms of 25 years ago. Yet the basic task is unchanged – that of positioning.

Reliability has improved. The latest hardware platform used, for instance, in the new Alstom A Series of DP systems boasts a theoretical MTBF (mean time between failure) of virtually 22 years.

Having seen reliability improve, however has not itself been enough for offshore users where life and limb, not to mention major financial or environmental impact, is the direct consequence of a position-keeping failure. This need for absolute surety of position keeping capability has led to the development of ever greater levels of equipment redundancy.

This trend is now firmly established with a redundancy criteria associated with every aspect of a DP system (eg. control computers, measurement systems, thrusters, generators, etc and, in

some instances the compartments in which these devices are located) being fully defined by leading classification societies and IMO.

In addition to the 'traditional' DP categories of Simplex and Duplex there are now categories known as Triple Voting and Class 3 systems. In the case of Triple Voting systems three control computers 'vote' on inputs from sensors and again 'vote' on outputs to thrusters and propellers.

A Class 3 system is one where a Duplex DP system is backed up by a remotely located Simplex DP system which is available in a safe location in the event of some catastrophic incident such as fire or flood at the primary operating position.

In Class 3 installations the principle of redundancy is extended to cover equipment spaces, for example a failure of a thruster or the compartment in which the thruster is located shall not result in a loss of position.

These equipment redundancy levels are certainly a significant way of improving system availability with the intention of reducing vessel downtime.

Having mentioned that the basic task of positioning a ship has remained unchanged it must be said that advances in technology had lead to the development of features and tools to assist the DP user in the implementation of that task.

The development of DP systems is never finished. Much time, money and energy is devoted to enhancing reliability and facilities.

Examples of such development are many, but perhaps it is the analytical and performance prediction tools which offer the greatest benefits. Examples of these are:

- **On-line capability plots.**

These enable the user to examine the thruster capacity versus given environmental circumstances and to produce the corresponding DP footprint. Several conditions may be examined simultaneously and calculated vessel performance with single or multiple machinery failures may also be examined.

- **Drift off Calculations**

These enable the user to predict the consequences caused by a drift off. They predict the vessel trajectory and heading changes which will occur over a user defined period of time, from the commencement of a drift off event under a range of user defined environmental conditions.

There is the eternal quest for better, more reliable position measuring systems. Alstom's most recent introduction is a laser based device known as CyScan. This system uses laser reflections from a number of fixed reflective targets to produce a position fix for a DP system. It is cleverly devised to be highly tolerant of 'lost' reflections and to be hugely tolerant of 'false' reflections, both of which have been failing in previous laser based systems.

insert diagram

**Configuration of Class 3 DP system: it is designed to remain operational with a single point failure both in terms of equipment and ship safety. The ship can continue being operated even in the single event of a major incident.**