

in depth

Passionate about ...

Dynamic Positioning



Ian Giddings, Technical Adviser at IMCA, explains why people can become passionate about dynamic positioning.

If a career in the offshore industry is known for anything it's for the almost endless variety of interest and challenge it can provide. Dynamic positioning (DP) is just one of the many specialisms available to master mariners, deck officers, engineers and technicians – and the science of accurately controlling a vessel's position and heading turns out to involve a surprising assortment of skills, techniques and technologies.

One of a series of careers features produced by the International Marine Contractors Association



in depth > Passionate about DP

DP has a critical part to play at each stage in the exploration for – and production of – oil and gas, as well as in marine construction, diving, hydrographic surveying, wreck investigation, underwater recovery, site survey, inspection and maintenance amongst others.

In all these situations, the role of DP is to control automatically the vessel's surge, sway and yaw as wind, wave and current attempt to interfere with its intended position or track. It achieves this through a combination of computing hardware and software, signals from transponders and gyrocompasses, and thruster controls, all pulled together at a central control console where the DP operator inputs the desired parameters.

Throw in lasers, GPS, Ethernet, LAN connections, transducers and hydroacoustic devices and DP can be seen to offer a tantalising array of technologies, all of which need to work in harmony to achieve the desired result.

You'll find a much more detailed introduction to the technology behind DP on our website (<http://www.imca-int.com/marine/reference/>) and one of the things that always amazes me about dynamic positioning is just how far, and how fast, the technology has evolved since the very first DP-equipped vessel – aptly named The Eureka – demonstrated her decidedly basic analogue control system in 1961.

Nowadays there are more than 1,000 DP-equipped vessels supporting an ever-increasing range of essential offshore activities. Some are designed specifically for supporting divers, others have wider multi-role function including diver support.

Life support is obviously the primary task for these diving vessels and that includes ensuring that there is always a safe distance between the diver's umbilical and the vessel's thrusters and propellers. As working depths increase beyond the 50m mark, DP vessels find themselves involved in supporting saturation diving, where the divers live in and operate from a hyperbaric chamber which becomes their home for up to 28 days at a time.

■ ROV-ing commission

It's when you combine dynamic positioning with another offshore technological passion of mine - the ROV, or remotely operated vehicle – that life starts to get even more interesting. As with DP, the technology involved in these mini un-manned submarines is becoming increasingly sophisticated, which in turn is leading to wider, and many would say more demanding applications.

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ROVs are used either to observe what's going on beneath the sea, during drilling for oil and gas or for carrying out an increasing number of the construction tasks previously handled by divers or for survey and inspection services prior to installation or to monitor the condition of the installed infrastructure. The fact that ROVs can operate at far greater depths than divers prompts a marked increase in their use as the search for new hydrocarbon reserves moves into deeper waters.

There's an essential partnership here between the ROV and the DP-equipped support vessel, where engineering decisions centre around the method of deployment and the need to maintain a safe operating distance from any other nearby vessels, drilling rigs or platforms.

■ Tracking the tractors

Among the most interesting applications for DP are the accurate placing and tracking of seabed tractors and trenchers used during the laying and burying of cables and pipelines.

This is where tracked crawlers are lowered to the seabed and then 'driven' along the line of the cable or pipe while the vessel is held accurately above by DP.

Laying a new pipeline presents its own set of challenges thanks to the unpredictable impact that constant changes in currents, sea state and wind conditions can bring. Through all of this, DP has to keep the lay barge on course and the pipeline correctly tensioned – no easy task when the weather takes a turn for the worse!

DP enables the sections of pipe to be welded, tested and coated on board, with the barge periodically moving forward by the exact distance of each joint length.

All the while it's essential that tension is maintained on the pipeline to prevent it from buckling. This is achieved by clamping the pipe between a pair of jaws which control its movement and send tension values back to the DP system, which is continually providing thrust commands to maintain tension, position and heading.

■ Dumping and dredging

Dynamic positioning also comes into play in controlling the placing (dumping) of rock on the seabed either to protect pipelines or combat erosion, as well as in dredging operations.

In both cases, DP has another trick up its sleeve in the form of an 'auto-track' function which enables a vessel to track accurately along a line defined by the waypoints of an earlier survey.

■ Drilling deeper

I suspect the clever people who developed the first DP system for the Eureka could not have imagined that more than 47 years later their brainchild would have become the enabler of an entirely new era in offshore oil and gas production.

Oil and gas exploration in many parts of the world has moved way beyond the reach of conventional moored drilling rigs, so deepwater developments in the Gulf of Mexico, offshore Brazil, West Africa and the UK West of Shetland areas have really only become possible because of the way in which DP enables mobile offshore drilling units to be set squarely and securely over the well during drilling operations.

One vital role for DP on deepwater drilling is to keep the riser connecting the vessel to the well as close to vertical as possible. Here again the forces of nature often do their best to disrupt things, but some DP control systems have an additional 'riser angle mode' under which the system makes small moves around the geographical position reference to reduce the riser angle.



■ Offshore loading

I'll never forget the first time I watched a shuttle tanker inching towards an FPSO (floating production, storage and offloading) unit. The sky was black, the sea heaving with a constantly lurching swell and yet the tanker was able to close up on the FPSO with what appeared to be mathematical precision.

The reason, of course, was DP – the technology that not only kept the FPSO constantly weather vaning around its turret moorings to maintain a steady heading to the weather, but also enabled the shuttle tanker to make a safe and accurate approach so that its loading hose could be connected.

Offshore loading, whether via a tethered buoy, submerged turret, fixed tower, or FPSO, always carries the potential for an environmentally-damaging spillage – a risk reduced through DP's role in enabling precise alignment of the loading hose and minimising the chance of a collision.

Year by year more uses and new developments are being found for DP, in fact wherever there's a need for vessel to hold its heading and position with near-pinpoint accuracy you'll find a DP system quietly going about its business.

And that, in turn, means that more and more career opportunities are opening up for the people who will design, develop and operate the DP systems of the present and future. It's the right place to be!

■ Further information

Our careers factsheet *I want to be a DP operator* sets out details on how you could get involved working with DP vessels.

For further details on IMCA's role, guidance and current activities in relation to DP vessels, including more on personnel training and experience requirements visit the Marine Division area of our website at www.imca-int.com/marine

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