



DYNAMIC POSITIONING CONFERENCE
October 15-16, 2013

RISK SESSION

Dynamic Positioning Safety Enhancement on the
U.S. Outer Continental Shelf

By LT Jeff Bybee and CDR Scott Kelly

U.S. Coast Guard

Abstract

Incidents such as the PIPER ALHPA and DEEPWATER HORIZON emphasize the need to focus on process safety, continual review of hazard control arrangements, effective communications, and maintenance of critical systems. The Coast Guard believes safe dynamic positioning (DP) operations are critical to offshore oil and gas development, exploration and production and should be subject to minimal safety requirements in these focus areas. The Coast Guard published Federal Register (FR) notices on May 4, 2012¹ and October 12, 2012² that recommended voluntary adherence to DP guidance provided by the Marine Technology Society (MTS) DP Committee (MTS DP guidance) and stated its intent to initiate a rulemaking addressing minimum DP requirements. This paper outlines key areas the Coast Guard might consider when developing a DP rule based on past Coast Guard outreach and the FR notices.

Introduction

Dynamic positioning systems are widely used by the offshore oil and gas industry to perform industrial missions such as drilling, pipe laying, heavy lifting, or diving operations and more routine missions such as cargo, personnel, or fuel transfers. The industrial missions are expanding, becoming more complex and going further offshore for longer periods of time, making station keeping reliability more critical. The DEEPWATER HORIZON casualty spurred the Coast Guard to re-examine its Outer Continental Shelf regulations in light of advancements in technology and other major incidents since these regulations were published³. While the Coast Guard concluded safety systems it regulated that were directly involved with the DEEPWATER HORIZON casualty (e.g. lifesaving) had a beneficial effect despite the extreme nature of the incident⁴, it also determined there were several critical areas where technology had gotten ahead of its regulations. These areas were highlighted in a paper the Coast Guard presented at the 2012 Offshore Technology Conference (OTC) titled “Lessons Learned Following Macondo-Safety Enhancements on the U.S. Outer Continental Shelf”⁵ (2012 OTC paper); dynamic positioning was one of these areas.

DP safety concerns

DP systems use computers and position referencing systems to automate control of vital power and propulsion systems and maintain a MODU or other vessel’s position. Safe DP operations are a process safety concern because severe consequences may result if a dynamically positioned MODU or other vessel suffers a loss of position (LOP)⁶ during critical activities⁷. For example, a LOP on a MODU during well test / completion operations could result in a subsea spill, which is difficult to contain. A LOP on an offshore support vessel could strike the gas export riser of a floating or fixed production

¹ “Mobile Offshore Drilling Unit Dynamic Positioning Guidance” 77 FR 26562, May 4, 2012, http://www.uscg.mil/hq/cg5/cg521/docs/DP_FR_Notice_2012-10669.pdf.

² “Dynamic Positioning Operations Guidance for Vessels Other Than Mobile Offshore Drilling Units Operating on the U.S. Outer Continental Shelf” 77 FR 62257, October 12, 2012, http://www.uscg.mil/hq/cg5/cg521/docs/DP_Non_MODUs_FR-Notice_2012-25132.pdf.

³ 33 CFR Subchapter N was published in 47 FR 9376 on March 4, 1982.

⁴ “Explosion, Fire, Sinking and Loss of Eleven Crew Members aboard the Mobile Offshore Drilling Unit Deepwater horizon in the Gulf of Mexico: Action By The Commandant” - September 09, 2011 available at: <http://www.uscg.mil/hq/cg5/cg545/dw/exhib/Volume%20I%20-%20Enclosure%20to%20Final%20Action%20Memo.pdf>.

⁵ This paper is publically available at: <http://www.uscg.mil/hq/cg5/cg521/>.

⁶ As defined in a MODU’s Well Specific Operating Guidelines (WSOG) or an OSV’s Activity Specific Operating Guidelines (ASOG).

⁷ Identified in draft MTS Techop “Defining critical activities requiring selection of critical activity mode”.

facility, which may result in an explosion, a loss of life, or an environmental event. A LOP on a dive support vessel conducting diving operations poses significant risk to the lives of divers. To facilitate safe DP operations and reduce the likelihood of a LOP occurring, the FR notices recommended owners and operators of dynamically positioned MODUs and other vessels follow MTS DP guidance⁸, which emphasizes hazard control arrangements, effective communications, and critical system maintenance through decision support tools such as the Critical Activity Mode of Operation (CAMO), the Well Specific Operating Guidelines (WSOG) and the Activity Specific Operating Guidelines (ASOG).

Intent to initiate a rule

The FR notices stated the Coast Guard's intent to initiate a DP rule that addresses minimum DP system design and operating standards and DP incident reporting requirements. Consistent with the "One Gulf, One Standard" approach discussed in the 2012 OTC paper, the Coast Guard is considering a coastal state requirement under the authority of the Outer Continental Shelf Lands Act (OCSLA) that would establish the same level of safety regardless of a vessel's flag state. This would represent a shift from current Coast Guard regulations, which permit OCS activities based on flag state implementation of international guidance⁹. While this would be a significant shift, the Coast Guard would likely consider international guidance as a foundation for any coastal state requirement. The 1994 International Maritime Organization's (IMO) MSC/Circ.645 "Guidelines for Vessels with Dynamic Positioning Systems," which is current international guidance, establishes baseline DP reliability requirements but leaves important design and operational items to the discretion of the flag state. Should the Coast Guard publish a DP rule as a coastal state, it may supplement MSC/Circ.645 to provide uniform requirements in areas presently left to the discretion of flag states. Consistent with the National Technology Transfer and Advancement Act of 1995 and Office of Management and Budget Circular A-119 (Revised, February 10, 1998) (OMB Circular A-119), the Coast Guard might consider incorporating industry standards into any proposed rule for DP systems. Since the Coast Guard has recommended MTS DP guidance, it might also consider incorporating it in a DP rule as a supplement to MSC/Circ.645. Additionally, the Coast Guard could also consider publishing a DP rule under authority in Title 46, United States Code, as a flag state.

Transparency and communication with industry

OMB Circular A-119 encourages federal agencies to participate in industry consensus standard and guidance development. The Coast Guard participates on the MTS DP guidance sub-committee and at annual DP conferences. These venues provide the Coast Guard with insightful feedback from leading DP industry experts on which areas are most critical to safety and what technological developments are most significant. The Coast Guard also receives feedback from the DP industry through other means. After publishing the FR notices, the Coast Guard initiated several teleconferences¹⁰ with designated leaseholders, drilling contractors, OSV companies, and DP assurance providers to solicit feedback on the FR notices and areas for consideration in any DP rule the Coast Guard might propose. Maintaining open communication with industry has provided the Coast Guard valuable feedback into potential costs and benefits of implementing a possible future rule to enhance DP safety on the U.S. OCS. This feedback has given the Coast Guard several key things to consider if it were to propose a DP rule.

⁸ "DP Operations Guidance" (Marine Technology Society, Part 1, Oct. 2010; Part 2, App. 1, Apr. 2012; Part 2, App. 2, July 2012; Part 2, App. 3, July 2012); and "DP Vessel Design Philosophy Guidelines".

⁹ 33 CFR 143.207(c) and 143.210 permit dynamically positioned MODUs with an IMO MODU Code Certificate issued by a foreign flag state to conduct OCS activities on the U.S. OCS. See NVIC 3-88 Ch 1 "Issuance of Letters of Compliance to Foreign Documented Mobile Offshore Drilling Units Operating on the Outer Continental Shelf of the United States".

¹⁰ These teleconferences took place in January 2013. The minutes are publicly available at <http://www.uscg.mil/hq/cg5/cg521/>.

Considerations for a potential DP rule

As discussed in the 2012 OTC paper, the Coast Guard might consider whether to include performance based requirements in a DP rule. Coast Guard requirements for MODUs and vessels operating on the U.S. OCS have traditionally been detailed and prescriptive. While prescriptive requirements can improve safety for more basic systems, they tend to reflect only technology available at the time they were published and offer limited flexibility. This can be limiting when covering technologically complex systems and can become quickly outdated when technology advances. For these reasons, the Coast Guard may consider use of appropriate performance-based requirements in a possible future DP rule. This approach could help solve known DP system problems such as the significant performance disparity between DP systems of same equipment class¹¹ caused by operational and maintenance decisions. For example, a DP equipment class 2 vessel may choose to operate with closed bus ties to limit emissions, save fuel and avoid wear and tear on equipment. However, this operational decision may compromise redundancy and lead to a LOP or other DP incident due to hidden failures or inadequate design. A performance based DP requirement may better encourage operation of dynamically positioned MODUs and other vessels within DP system design limits and/or enhancement of DP system designs. The MTS DP Guidance, especially its CAMO, WSOG and ASOG decision support tools provide an excellent framework for the Coast Guard to consider a performance based requirement. A performance based requirement would be consistent with the approach in the FR notices.

The Coast Guard might also consider proposing a risk-based approach in a potential DP rule. The Coast Guard has a history of publishing risk based regulations. For example, its regulations for U.S. passenger vessels impose a higher safety standard as the vessel's tonnage or passenger count increases. In the context of conducting OCS activities using DP, the Coast Guard might associate different risk levels with different vessel types and/or OCS activities. A risk-based approach along these lines might call for higher level DP reliability during activities where a LOP may result in the most severe consequences. For example, the Coast Guard might consider that an offshore supply vessel using DP to conduct a cargo transfer poses a lower level of risk than a MODU using DP to conduct well test or completion operations. If the Coast Guard were to propose a risk-based rule, the MODU in this example could be subject to more stringent DP requirements.

The failure modes and effects analysis (FMEA) is a key document that establishes DP system design limits, and the Coast Guard might consider minimum requirements for the quality of this document in a potential DP rule. Because of the complex technical nature of DP systems and the number of FMEA documents produced for dynamically positioned MODUS and other vessels operating on the U.S. OCS, the Coast Guard could consider requirements that allow FMEA review on behalf of the Coast Guard by classification societies or other third parties that meet a minimum level of DP assurance competency. If the Coast Guard were to propose minimum DP FMEA quality requirements and/or establish third party DP assurance competency requirements, consultation with classification societies, DP assurance organizations and/or its National Offshore Safety Advisory Committee (NOSAC) before doing so may be appropriate and beneficial.

Marine personnel competency is an essential part of safe DP operations and the Coast Guard might consider minimum DP competency requirements in a potential DP rule. MTS DP Guidance encourages marine personnel to have a thorough knowledge of a dynamically positioned vessel's FMEA, CAMO and WSOG/ASOG so he or she understands the vessel's capabilities and can appropriately respond to a DP incident. Consistent with OMB Circular A-119, the Coast Guard might consider existing industry guidance for any potential minimum DP competency requirement.

¹¹ See IMO MSC/Circ.645 Section 2.2 for a discussion of DP equipment classes.

Coast Guard non regulatory efforts to enhance DP safety

The Coast Guard has stated its intent to initiate a DP rule but has not yet proposed one. However, it has initiated several non-regulatory efforts, in addition to the FR notices, to enhance DP safety and inform a potential DP rule. It has conducted external outreach to drilling companies on the FR notices and has added DP to its inspector training curriculum. It has also committed to sending officers to obtain Master's degrees in appropriate technical disciplines and supplement this education with appropriate DP industry training. These officers will staff technical billets that would develop DP policy, any future regulations and standards, and/or perform technical oversight of DP systems under a potential DP rule. The Coast Guard also recently published a policy¹² to facilitate voluntary DP incident reporting as described in 77 FR 26562 and several safety alerts. We encourage industry to view voluntary reporting of DP incidents as an opportunity to facilitate safe DP operations through Coast Guard Safety Alerts, which help inform the Coast Guard on what regulatory and policy actions would be appropriate and how the Coast Guard could best perform oversight of DP system safety.

Conclusion

The Coast Guard has identified safe DP operations as a focus area in its OCS safety and environmental protection mission. It has published voluntary guidance, stated its intent to initiate a DP rule and performed substantial outreach to the DP industry. It is working with advisory committees, standards organizations and industry leaders to develop a comprehensive and effective DP oversight system. Based on its published guidance and outreach, the foundation of this system will likely be a DP rule published under the authority of OCSLA. The Coast Guard may consider international and industry DP standards, performance requirements, a risk based approach, leveraging of third parties and DP personnel competency requirements in the development of a potential DP rule.

¹² CG-5PC Policy Letter 77 FR 26562, "**Voluntary Reporting of Dynamic Positioning (DP) Incidents on MODUS**", June 19, 2013, <http://www.uscg.mil/hq/cg5/cg521/docs/CG-5PC%20Policy%20Letter%2077%20FR%2026562.pdf>.