



## Closed Bus Tie Systems

Why to operate a DP vessel in closed bus tie configuration?

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## Why to operate a DP vessel in closed bus tie configuration?

Operating a DP vessel in closed bus tie configuration introduces unquestionable benefits in terms of operational and maintenance costs of the equipment throughout the entire lifespan of the vessel, as well as in terms of lower environmental impact. Moreover a closed bus tie power system provides superior tolerance to plant faults, increasing the overall system reliability.

Indeed, if compared against open bus tie mode of operation, closed bus tie gives a better operational availability and less running hours and higher efficiency working conditions of the main engines.

All these benefits are counterbalanced by additional challenges in the design of the control, protection and management systems of the power plant. The designer shall be aware of single point / common source failures which can lead to total black-out or loss of all thrusters when the bus tie breakers are closed. Examples of those type of failures are: short circuit, earth fault, AVR or excitation fault, governor fault, etc.



A photograph of a control room, likely for an offshore oil rig, featuring a long console with several large monitors displaying data. The room is dimly lit with overhead fluorescent lights. A semi-transparent blue overlay covers the entire image, and a white text box is centered over the middle section.

**Utilizing 30 years of consultancy experience in the offshore business, Global Maritime can offer the best fit for purpose package of services, supporting designer and owners from the conceptual phase of closed bus tie DP2 and DP3 projects, through the acceptance tests, to the operational phase.**

## Conceptual design

Conceptual design is vital to the successful development of closed bus tie DP2 and DP3 projects.

Global Maritime conceptual design and Front End Engineering Design (FEED) studies guide our customers in taking the right choice between different design solutions and available technologies, in order to lay the foundations for an affordable and effective design.





## Contracts agreements and purchasing support



Basing on decades of experience in offshore industry, Global Maritime can lead complex procurements involving teams with experienced engineers who blend equipment expertise with in-depth DP systems knowledge.

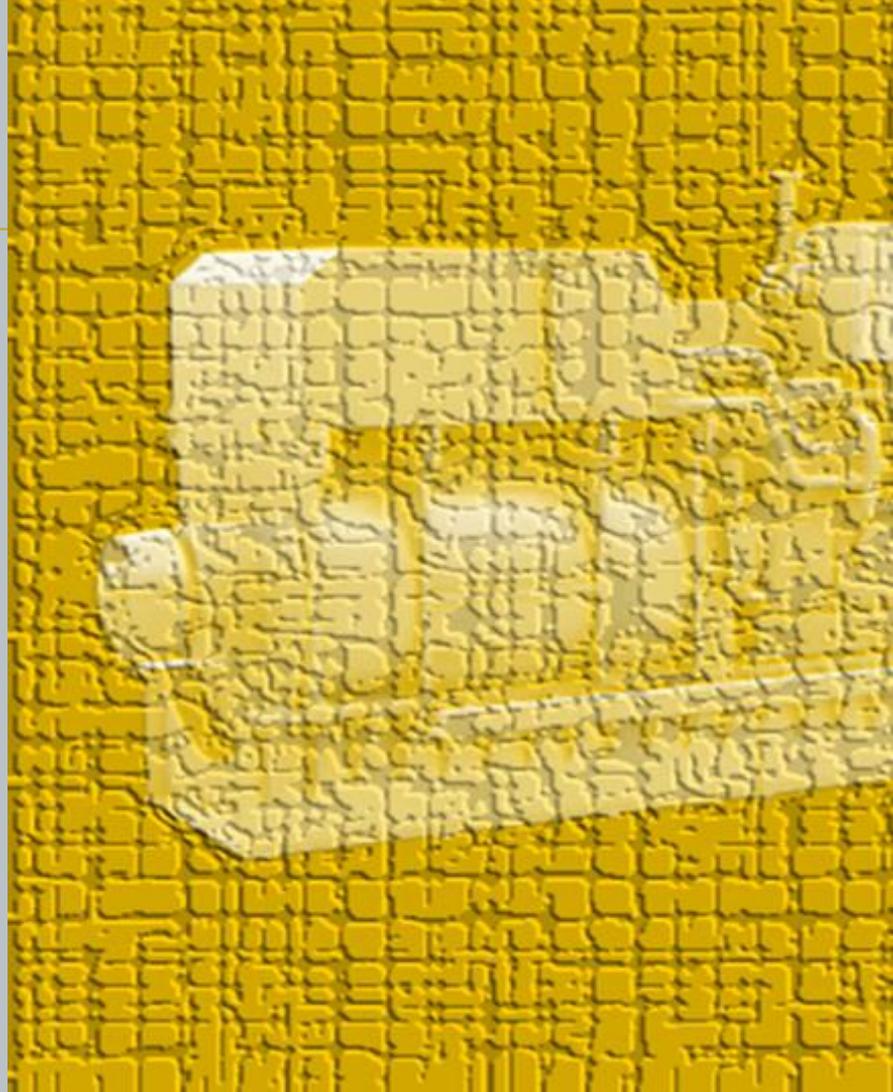
Global Maritime can either integrate into customer's team, or can fully handle a procurement project. When negotiating for our clients or providing negotiation advice, we ensure that our clients will achieve the best solutions and outcomes.

## Design verification

Basic and detailed designs are the most crucial part of closed bus tie projects execution.

Global Maritime design verification will ensure that the subsystem comprised in the power plant will be in compliance with the applicable Classification Societies rules, International Association guidance as well as best industries practice.

Global Maritime specialists will support the design phase with our comprehensive overall understanding of closed bus tie DP systems, taking particular care of the interfaces between different subsystems, often supplied by different vendors, where show stoppers usually arise at later stages of the project.



## FMEA gap analysis

Often FMEA reports approved by Classification Societies are not at the technical detailed level required by charterers.

Global Maritime can provide gap analysis of FMEA reports in line with the best industry practices (e.g. Class Rules, IMCA and MTS guidelines).

## DP FMEA report and sea trials

DP FMEA and sea trials for closed bus tie systems are much more complex and much more demanding than traditional FMEA for open bus tie power plants.

Global Maritime analysts will not only evaluate the single point/common source of failures, but, assuming the possible presence of hidden failures, will also address and analyse primary and secondary barriers in place for each failure mode.

Global Maritime DP FMEAs and sea trials are developed by multidiscipline teams of experts, including machinery, electrical, instrumentation and control engineers.

The final result will comply with the best industry practices, latest standards and newest international guidelines.



# Transient stability analysis

According to leading class societies' requirements, for DP vessels operating in closed bus tie mode, the designer shall provide a transient stability evaluation of the power system, supported by a computer based model of the plant.

System stability is a concern when two or more generators operate in parallel. Sudden disturbances such as short circuits, impact loads and switching conditions will cause transient speed changes on the generators, which may prevent the system from remaining in synchronous operation.

Global Maritime can provide the proper tailor made analysis able to simulate all the failure modes required by the applicable rules: analysis work is carried out using tried and proven computer programs.

## Short circuit and earth fault live tests

Leading class societies rules (e.g. ABS and DNV GL) introduced a live short circuit test requirement for DP3 plant operating in closed bus tie configuration.

The purpose of the test is not only to evaluate the voltage dip ride through capability of the essential consumers, but also to validate the dynamic model of the system used in the transient stability study.

The short circuit live test is a potential harmful test: during this tests high currents are released from the generators, which represent a possible danger for the personnel involved. Moreover the equipment is subjected to electromechanical stresses which might compromise their functionality or reduce their expected lifespan.

Global Maritime supports the customer with tailor made:

- risk evaluation study,
- detailed test procedures including test results measurement strategy,
- test results analysis for model validation.







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