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Dynamic Positioning Conference

DP System Considerations

Global Marine - Hull's 456

MTS DYNAMIC POSITIONING COMMITTEE

Bob Donley - Global Marine

Westchase Hilton, Oct. 14,1998

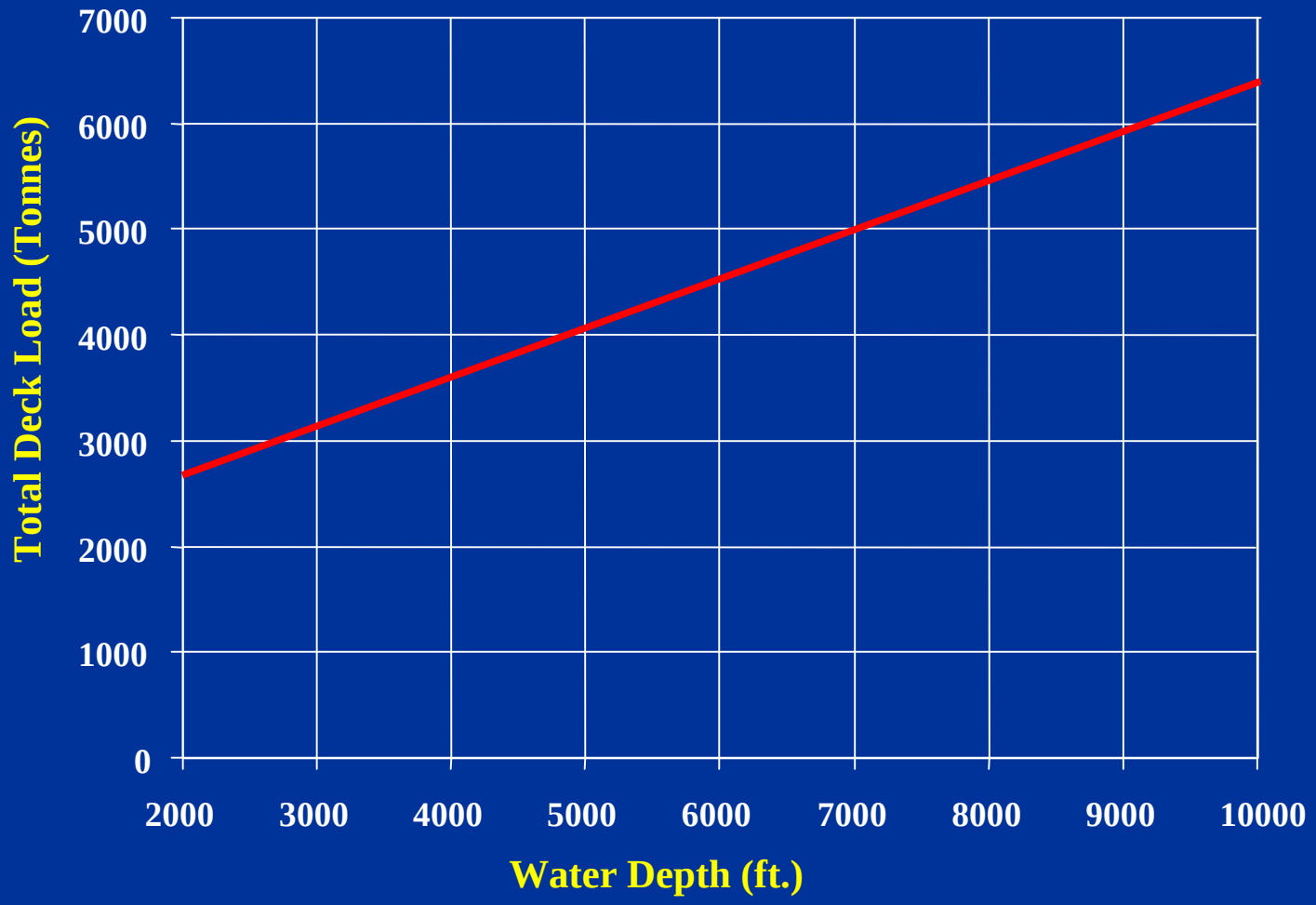
Dynamic Positioning Committee
Marine Technology Society

Glomar Hull 456 Class

Latest DP Drillship Design Criteria

- **Riser Storage Capacity - 10 ~12,000 ft.**
- **Crude Storage Capacity - 100 ~200,000 bbl.**
- **Connected Environment & Current Loading ~ GOM Loop Currents**
- **Derrick Capacity - 2MM lbs..**
- **Deck Storage Area - Long Riser Strings, 6-5/8" Drill Pipe and Space for Well Testing Gear.**

Estimated Deck Load Requirements



Glomar Hull 456

- **Length :** 752 ft
- **Breadth :** 118 ft
- **Depth :** 58 ft
- **Variable Load :** 22,000 tonnes
- **Displacement :** 53,000 tonnes
- **Quarters :** 150 persons (1/2 Pax rooms)
- **Moonpool :** 42 ft x 42 ft
- **Operating Water Depth :** 12,000 ft

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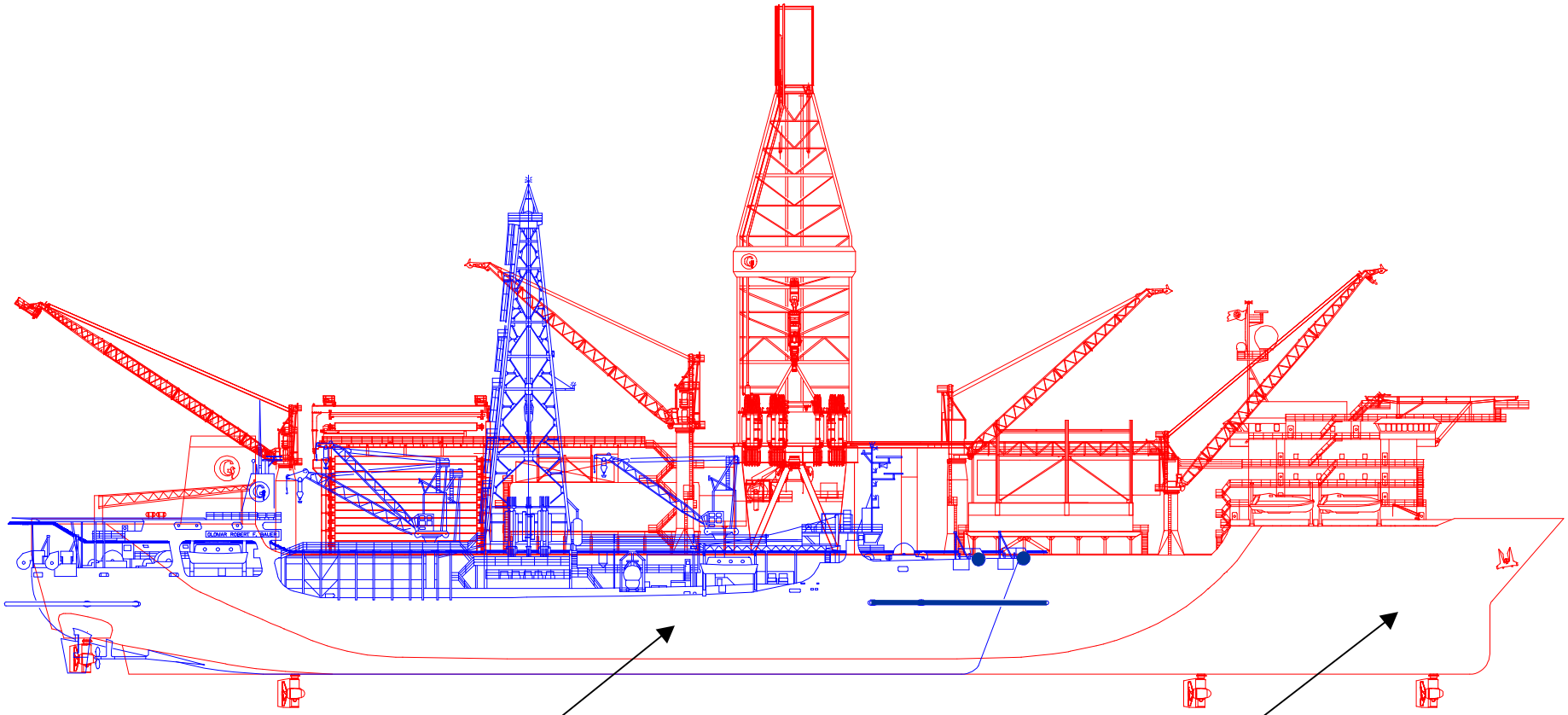
Global Hull Size Comparison



Glomar R. F. Bauer

444 ft. & 15,000 mt.

Glomar Hull 456

752 ft. & 53,000 mt.

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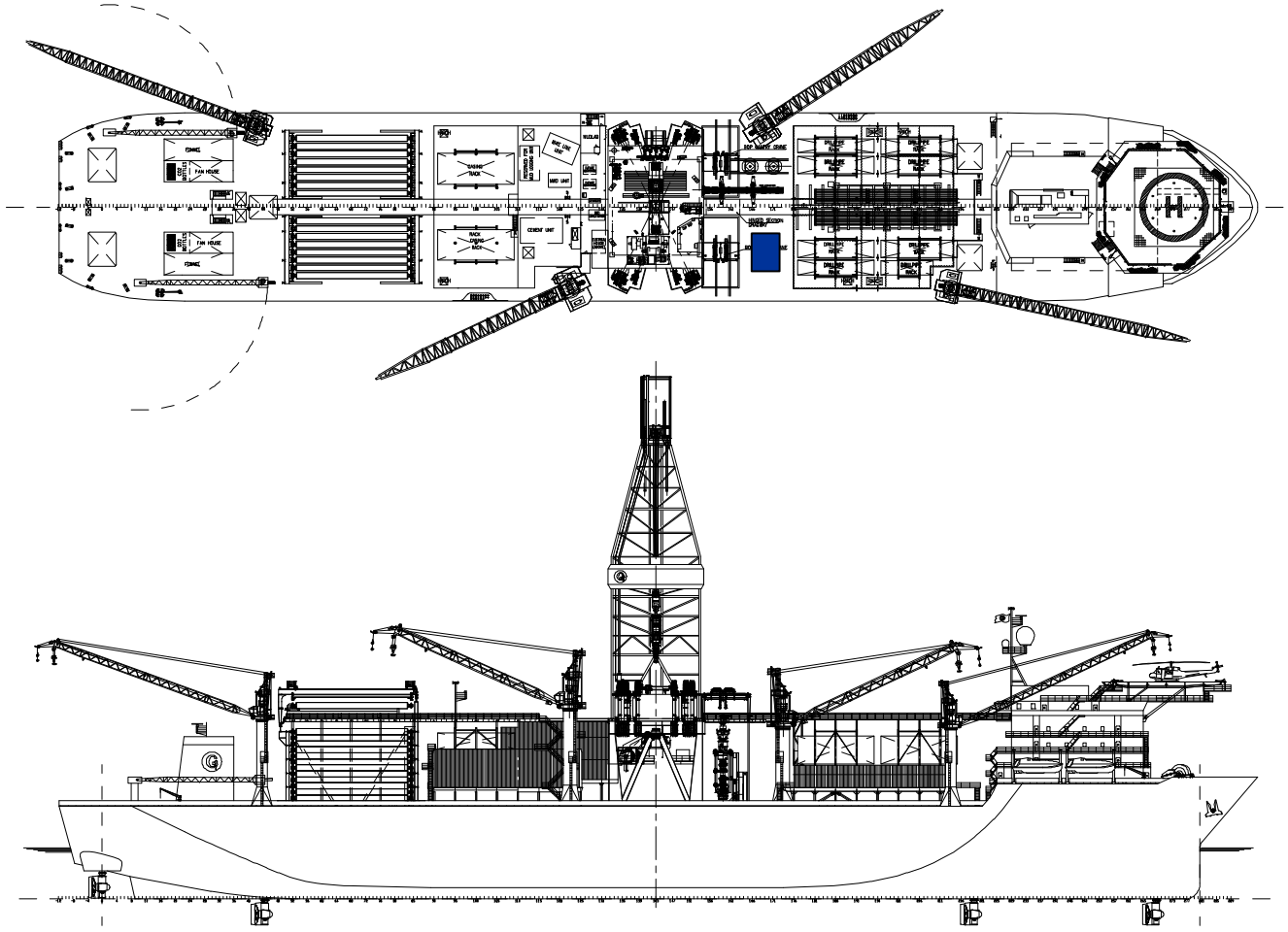
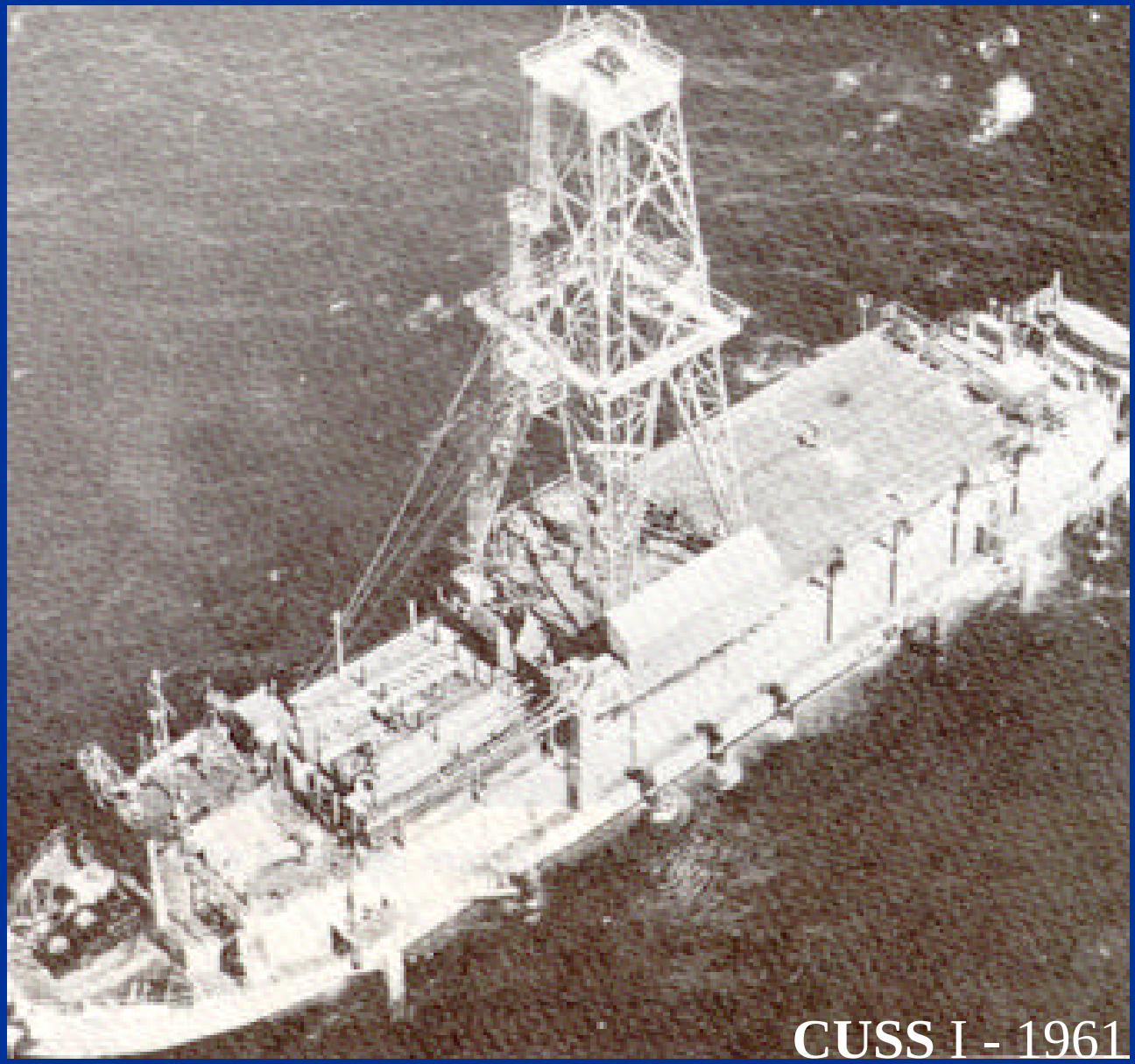
Glomar Hull 456



Rig Layout



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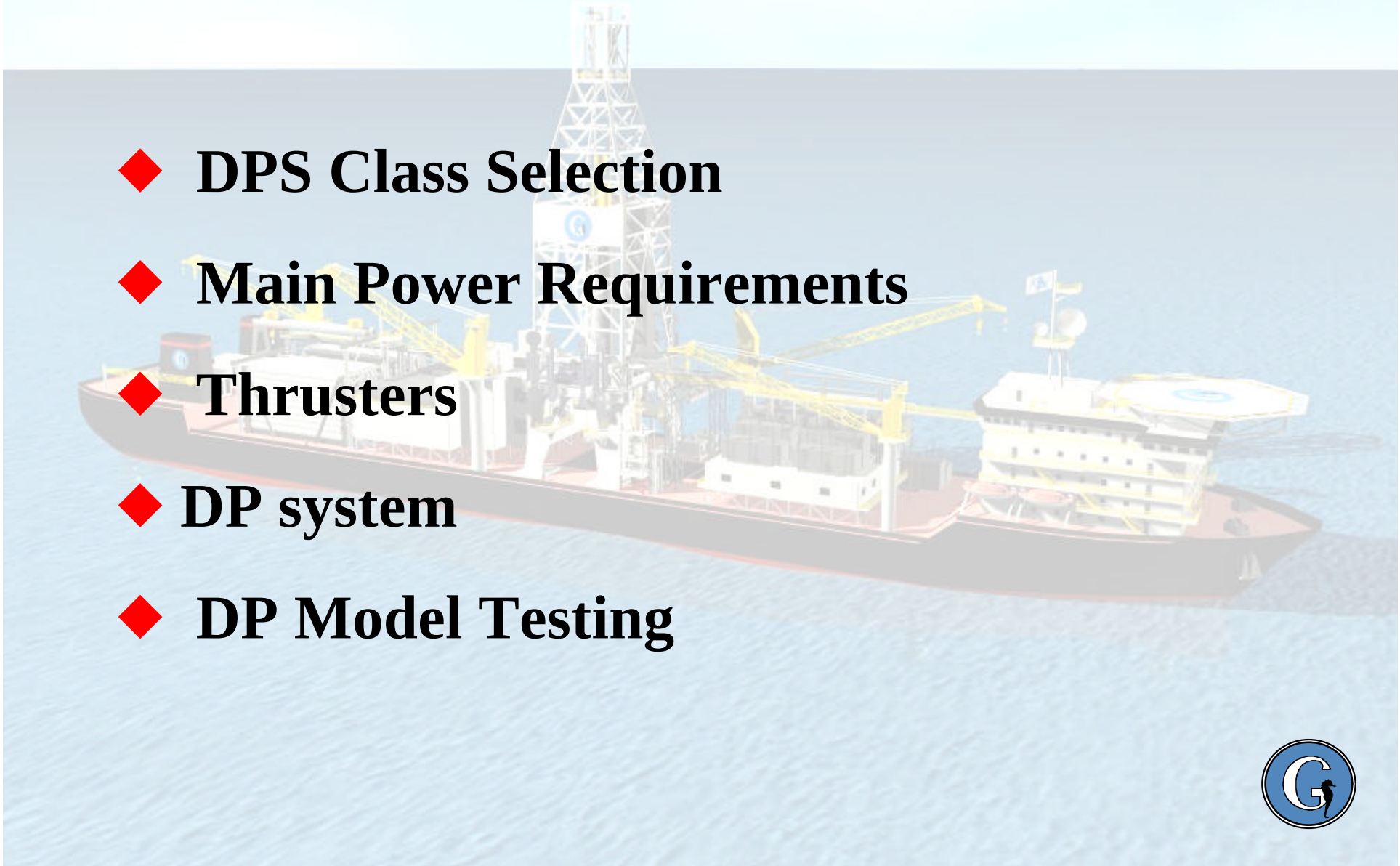
Ship/DP System Design Considerations



- **DPS Class Selection**
- **Main Power Requirements**
- **Thrusters**
- **DP system**
- **DP Model Testing**

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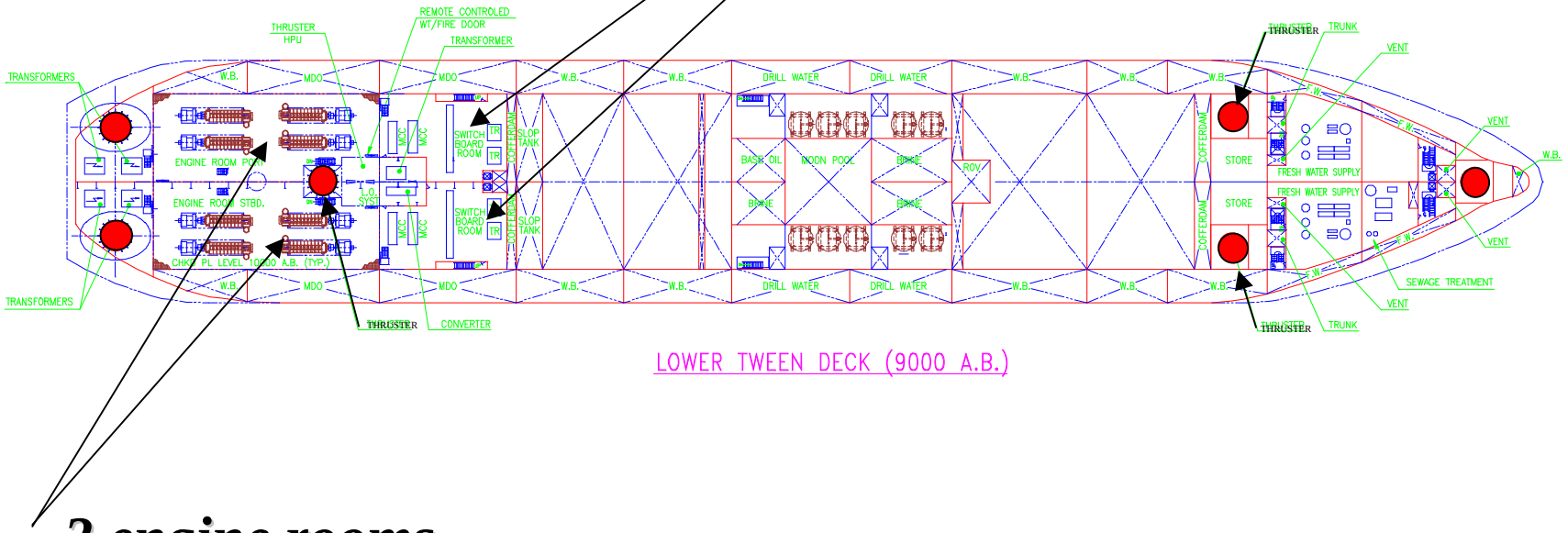
ABS DPS Class 3 Separation



Glomar Hull 456 Class

Power and Stationkeeping

Main Power Requirements

Based on: Hull Form

Displacement

w/approximate requirements for:

Drilling systems

Top Speed

Dynamic Positioning

- **Power Generation**
  - Eight (8) MAN B&W Engines, 9 cylinder in-line
  - TOTAL ELECTRICAL POWER = 34.6 MW (46,300 HP)

Glomar Hull 456 Class

Power and Stationkeeping

- Capsule Thrusters - Kamewa
  - Three (3) Fwd 5 MW Azimuthing
  - One (1) Aft 5 MW Azimuthing
  - Two (2) Stern 5 MW Azimuthing
  - TOTAL THRUSTER POWER = 30 MW (40,200 HP)

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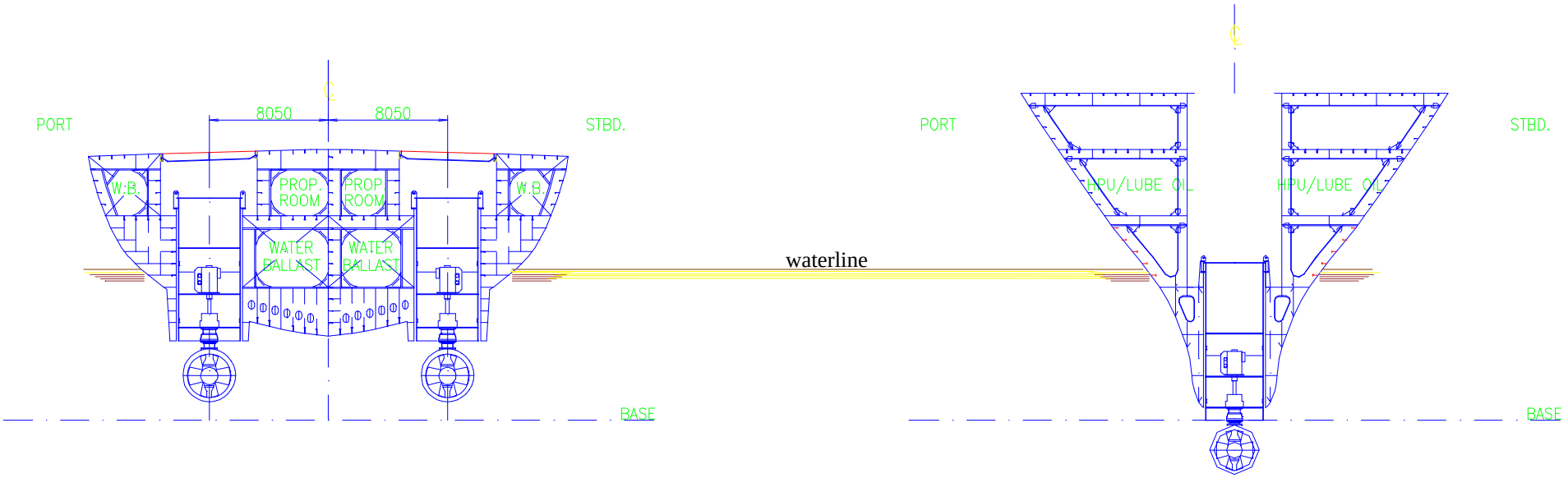
Retractable Capsule Thrusters



TRANSVERSE SECTION THRUSTERS
I.W.O. FRAME −4 – FRAME 4

TRANSVERSE SECTION THRUSTER
I.W.O. FRAME 265 – FRAME 273

Stern Thrusters #5 & #6

Bow Thruster #1

Glomar Hull 456 Class

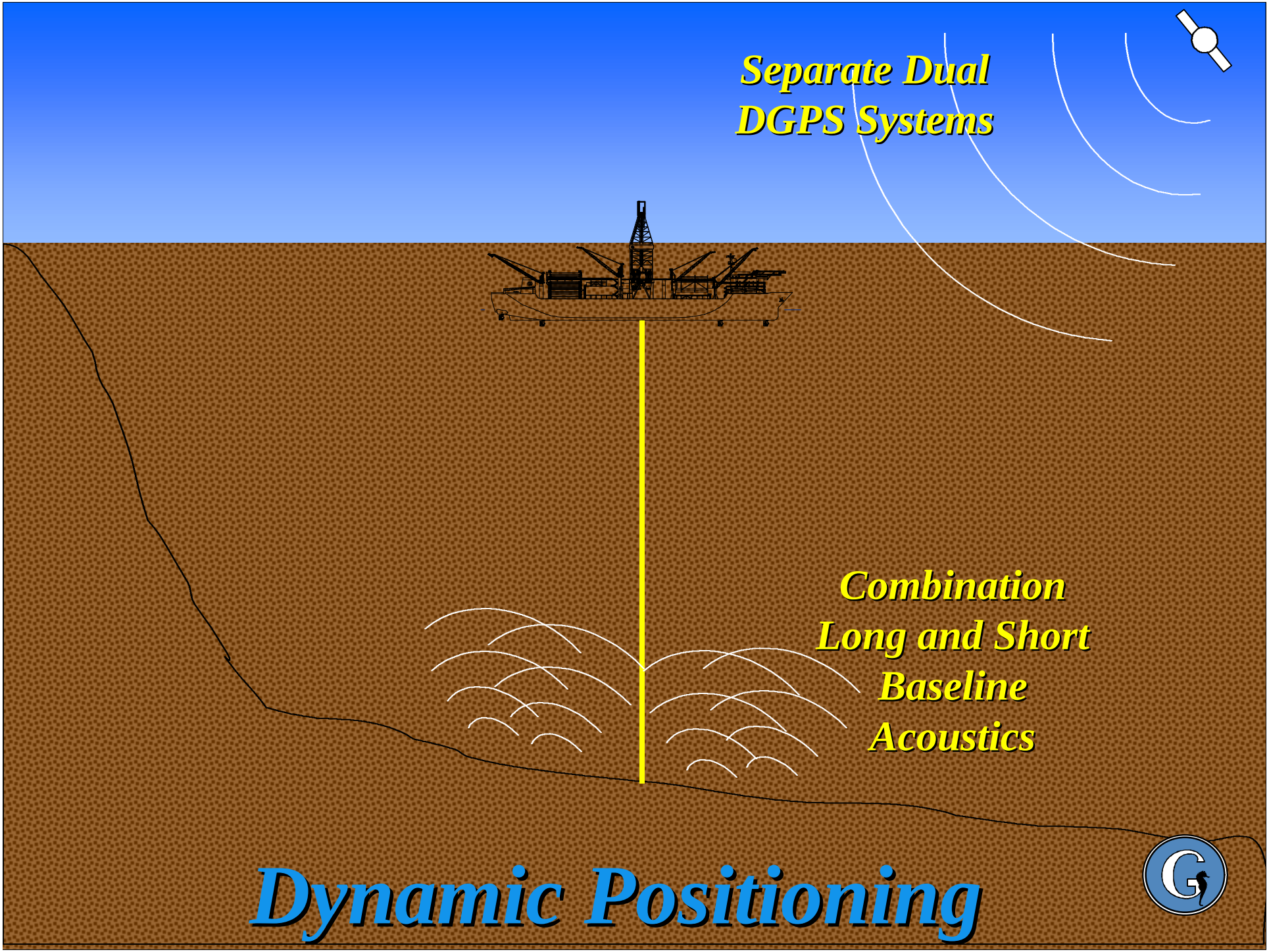
Power and Stationkeeping

- DP System - Nautronix
  - DPS 3, Triple Redundancy
  - Two Control Locations

Dynamic Positioning Equipment

Primary DP Control Console

Glomar Explorer - primary DP console



Dynamic Positioning

DP Model Tests

- **Total Testing Program**
  - **Wind Tunnel**
  - **Full DP tests**
  - **Resistance and Propulsion**
  - **Sea Keeping**

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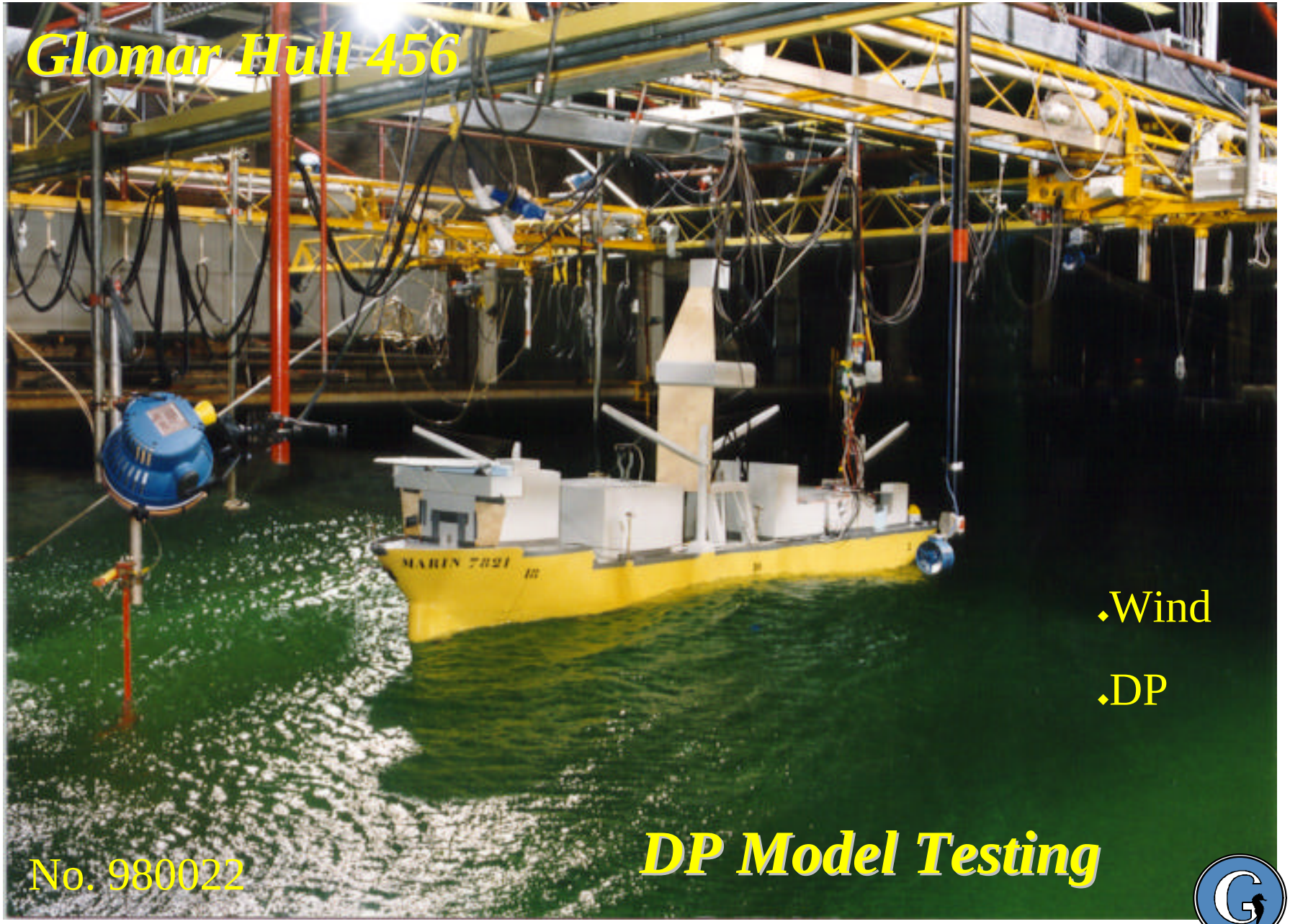

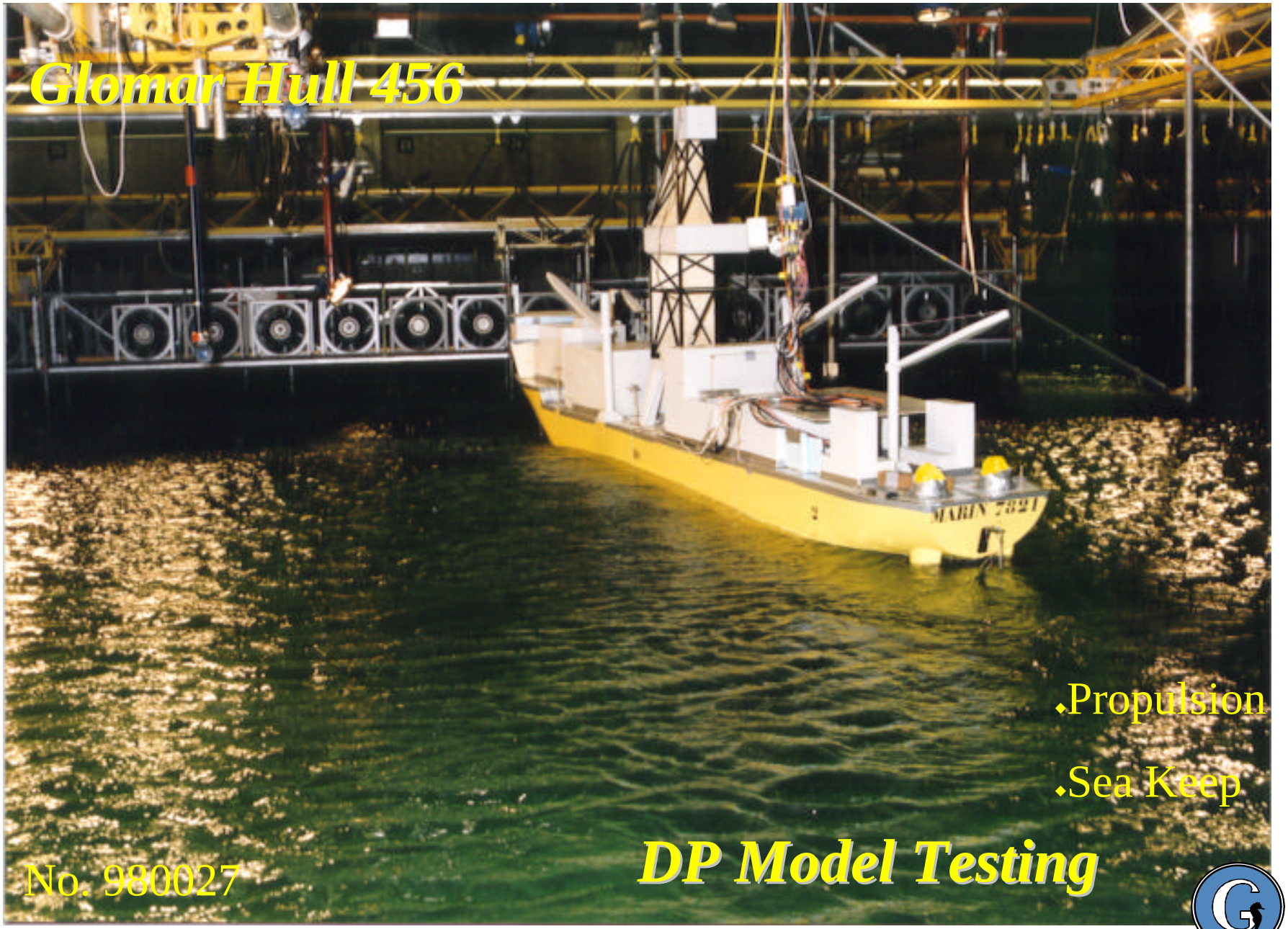
Glomar Hull 456
.Propulsion
.Sea Keep
No. 980027
DP Model Testing

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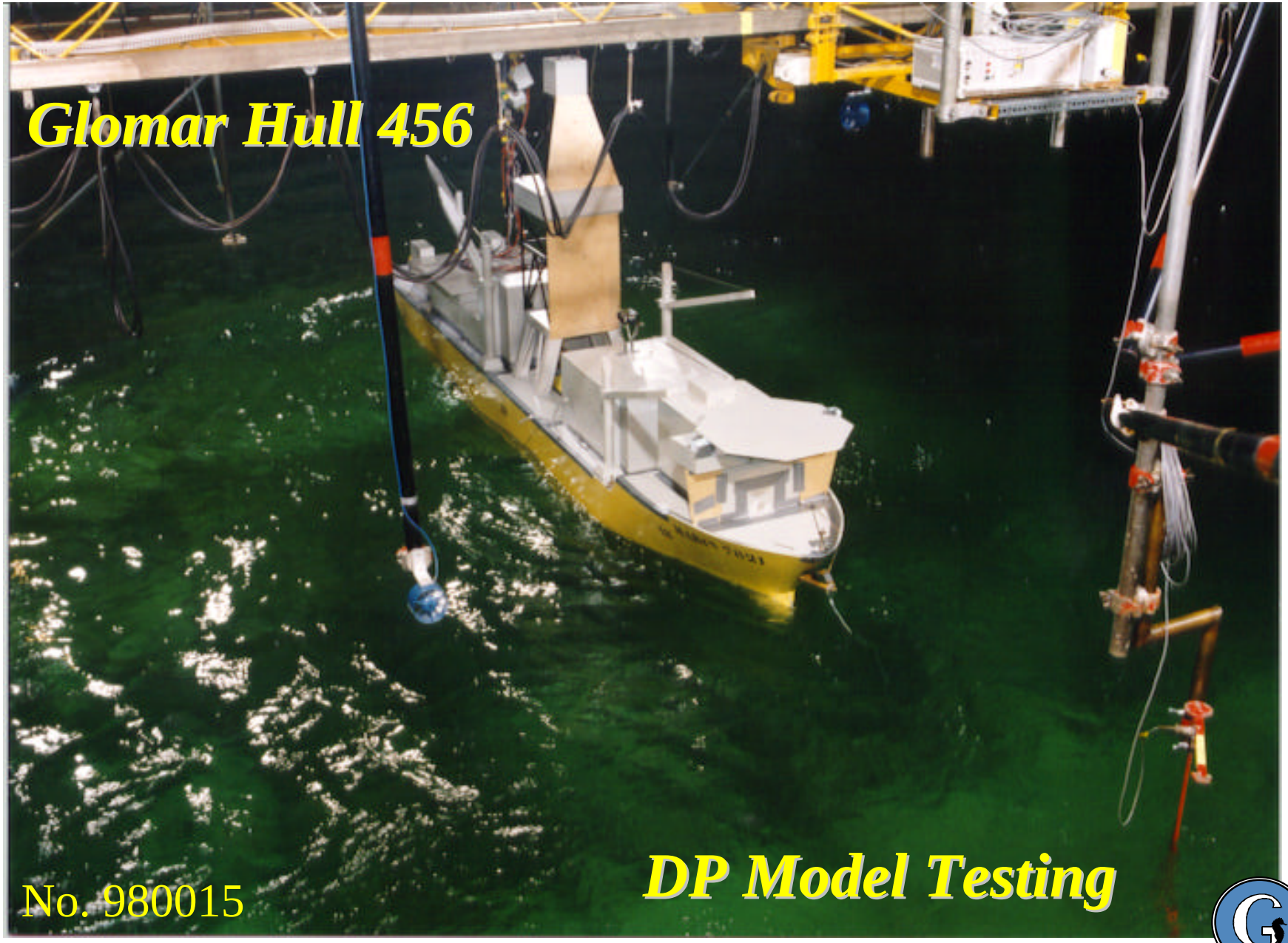

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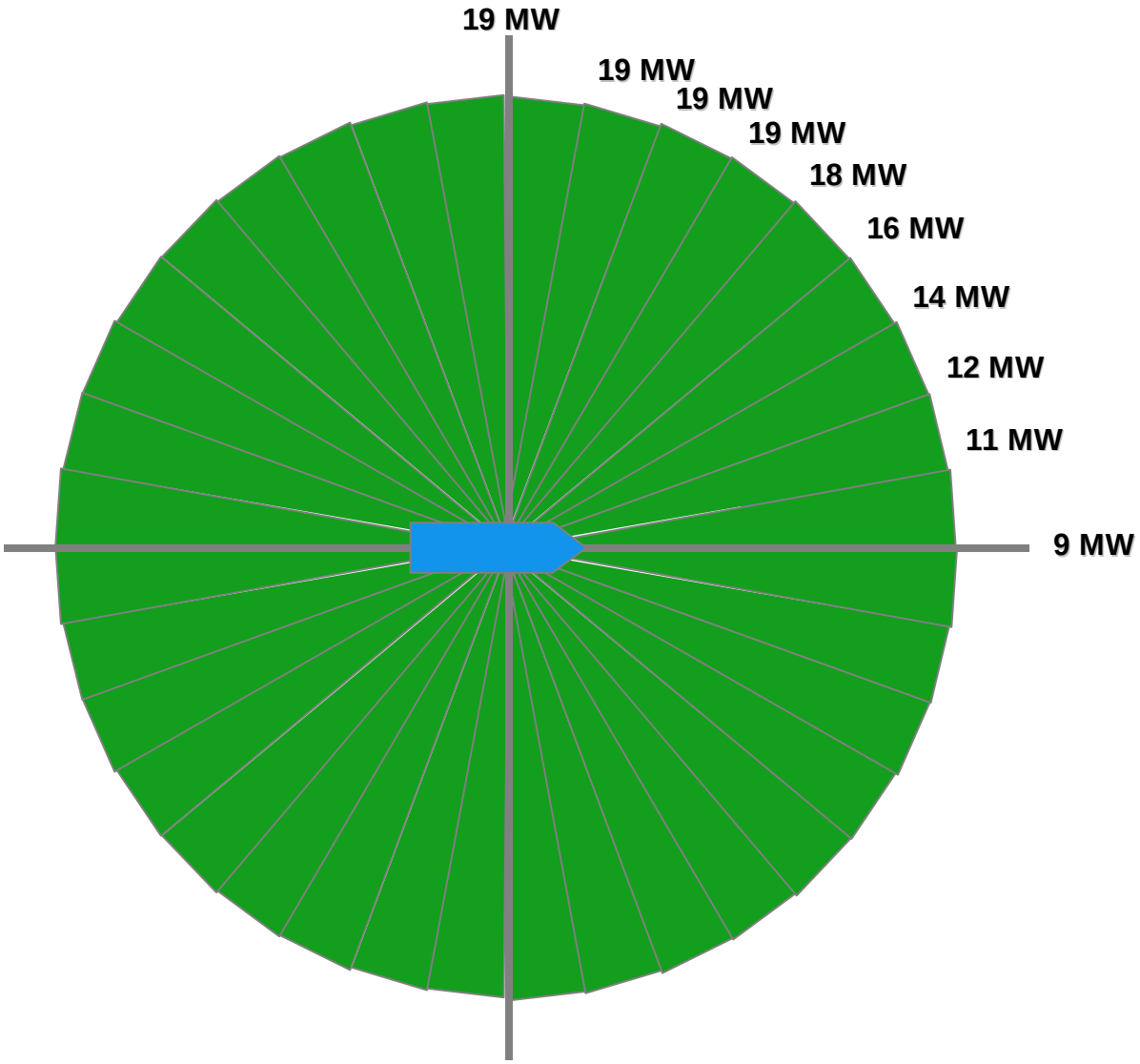
Glomar Hull 456

Sudden Squall



WIND = 61.0 knots @ 180°

WAVES = 0.0 ft @ 180°

CURRENT = 0.0 knots @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : 5 MW

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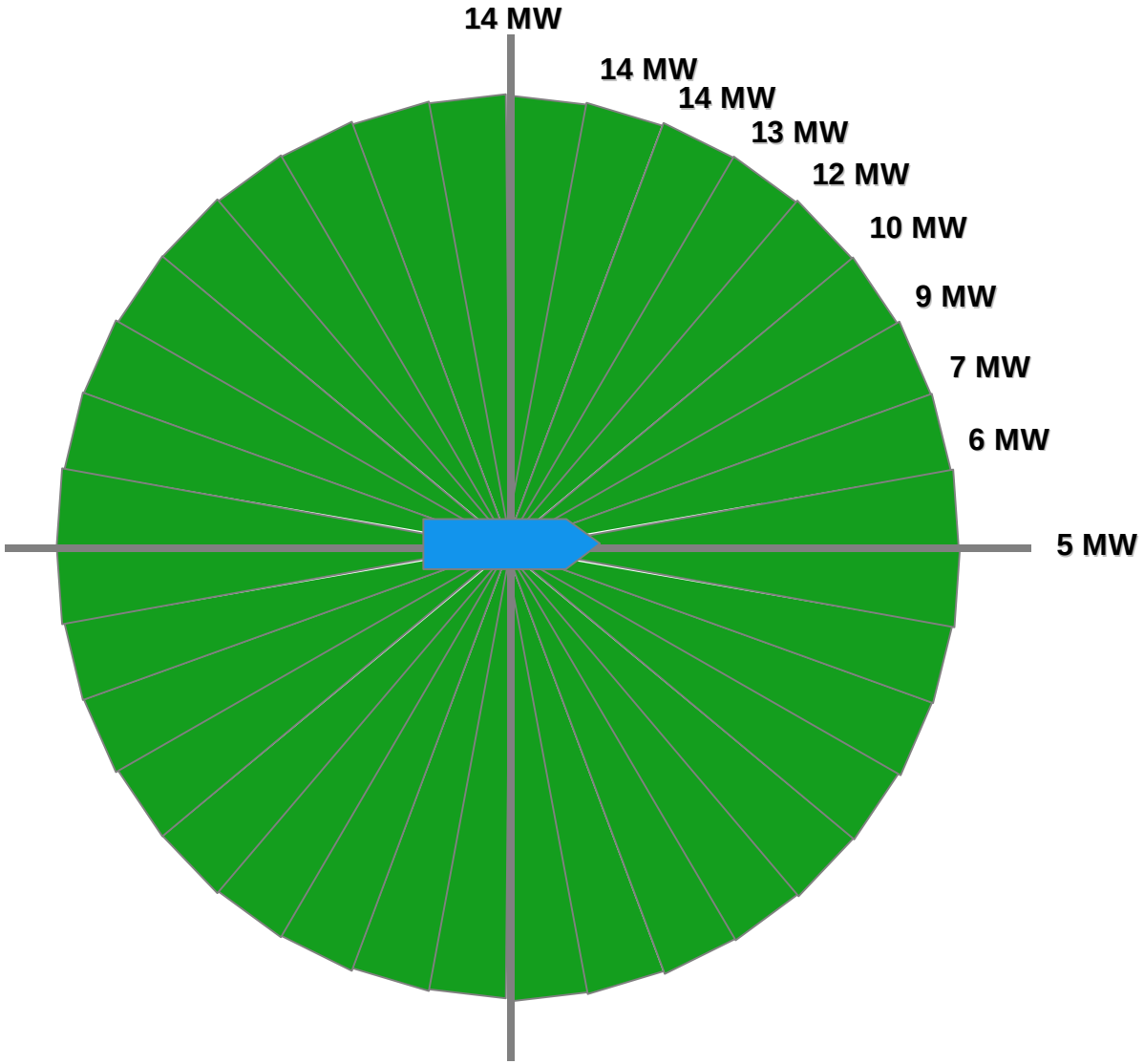
Glomar Hull 456

1 YR Winter Storm



WIND = 42.2 knots @ 180°

WAVES = 15.1 ft @ 180°

CURRENT = .72 knots @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : 5 MW

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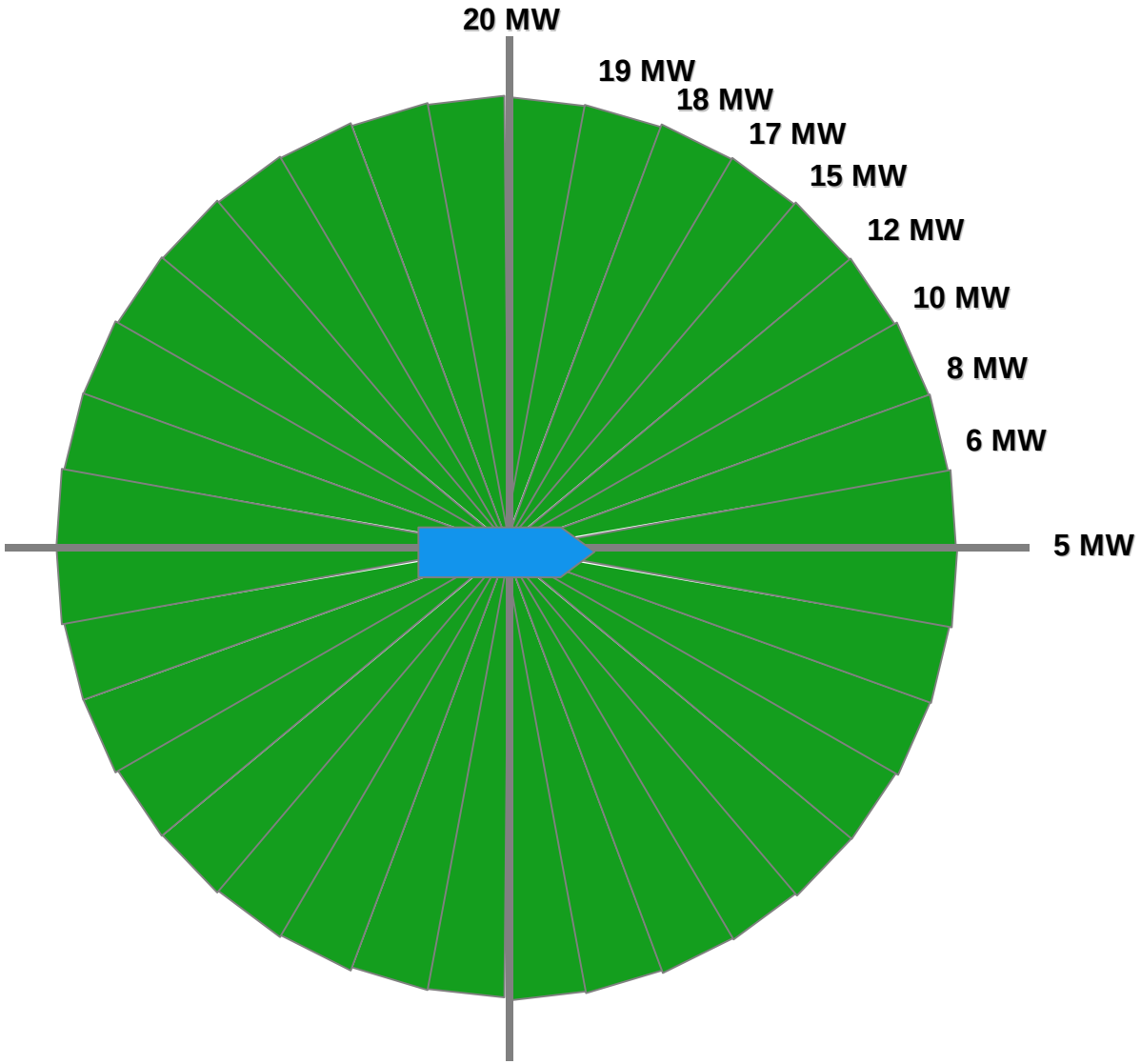
Glomar Hull 456

10 YR Loop Current



WIND = 32.1 knots @ 180°

WAVES = 11.8 ft @ 180°

CURRENT = 3.2 knots @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : 5 MW

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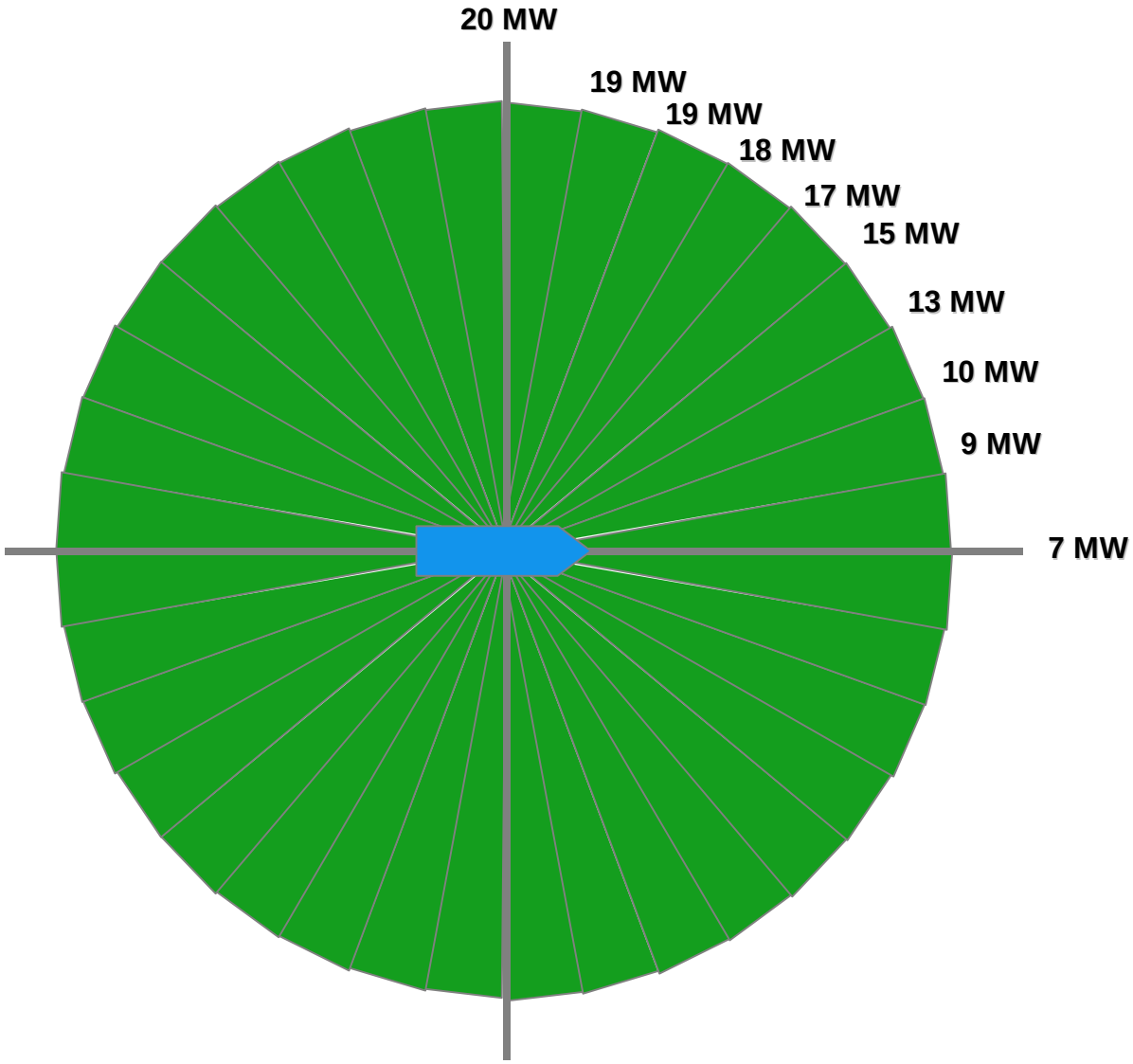
Glomar Hull 456

50 YR Winter Storm (intact)



WIND = 52.5 knots @ 180°

WAVES = 23.95 ft @ 180°

CURRENT = 0.89 knots @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : 5 MW

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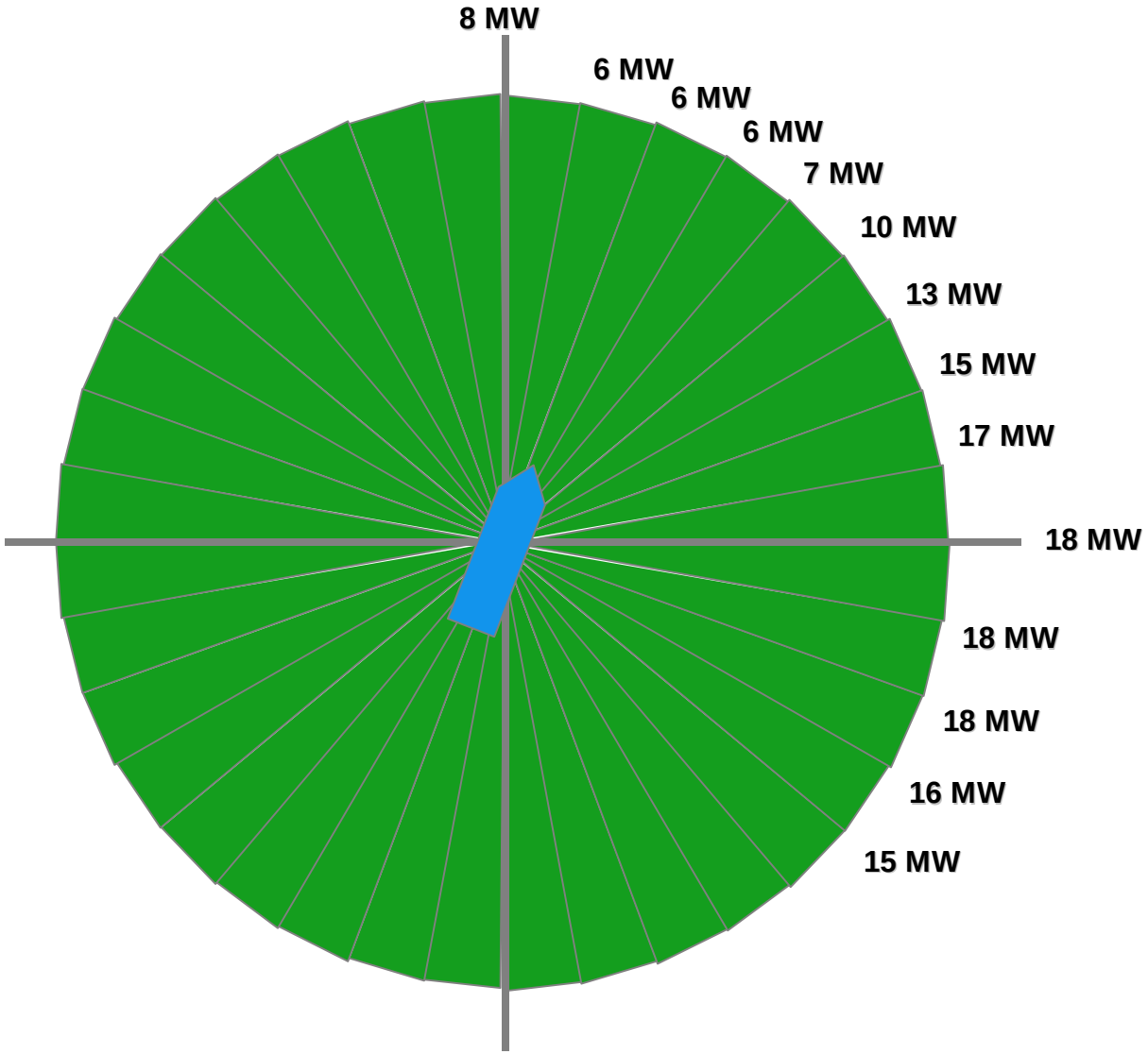
Glomar Hull 456

10 YR Loop Current



CURRENT = 4.0 knots @ 90°

WIND = 32..0 knots @ 180°

WAVES = 6.0 ft @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : 5 MW

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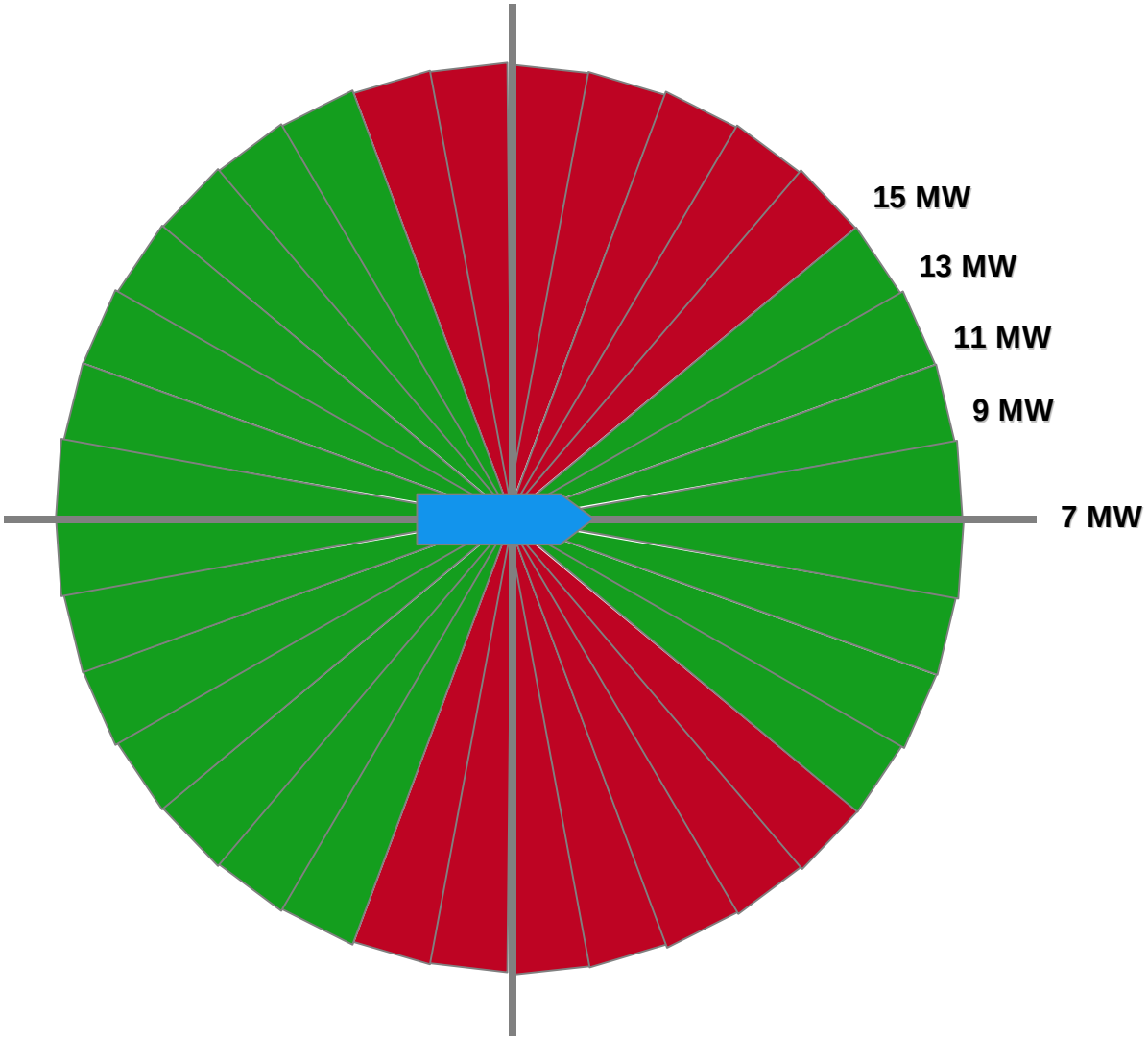
Glomar Hull 456

50 YR Winter Storm (thruster failure)



WIND = 52.5 knots @ 180°

WAVES = 23.95 ft @ 180°

CURRENT = 0.89 knots @ 180°

#1 THRUSTER : 5 MW

#2 THRUSTER : 5 MW

#3 THRUSTER : 5 MW

#4 THRUSTER : 5 MW

#5 THRUSTER : 5 MW

#6 THRUSTER : OFF

Glomar Hull 456 Class

Harland and Wolff