



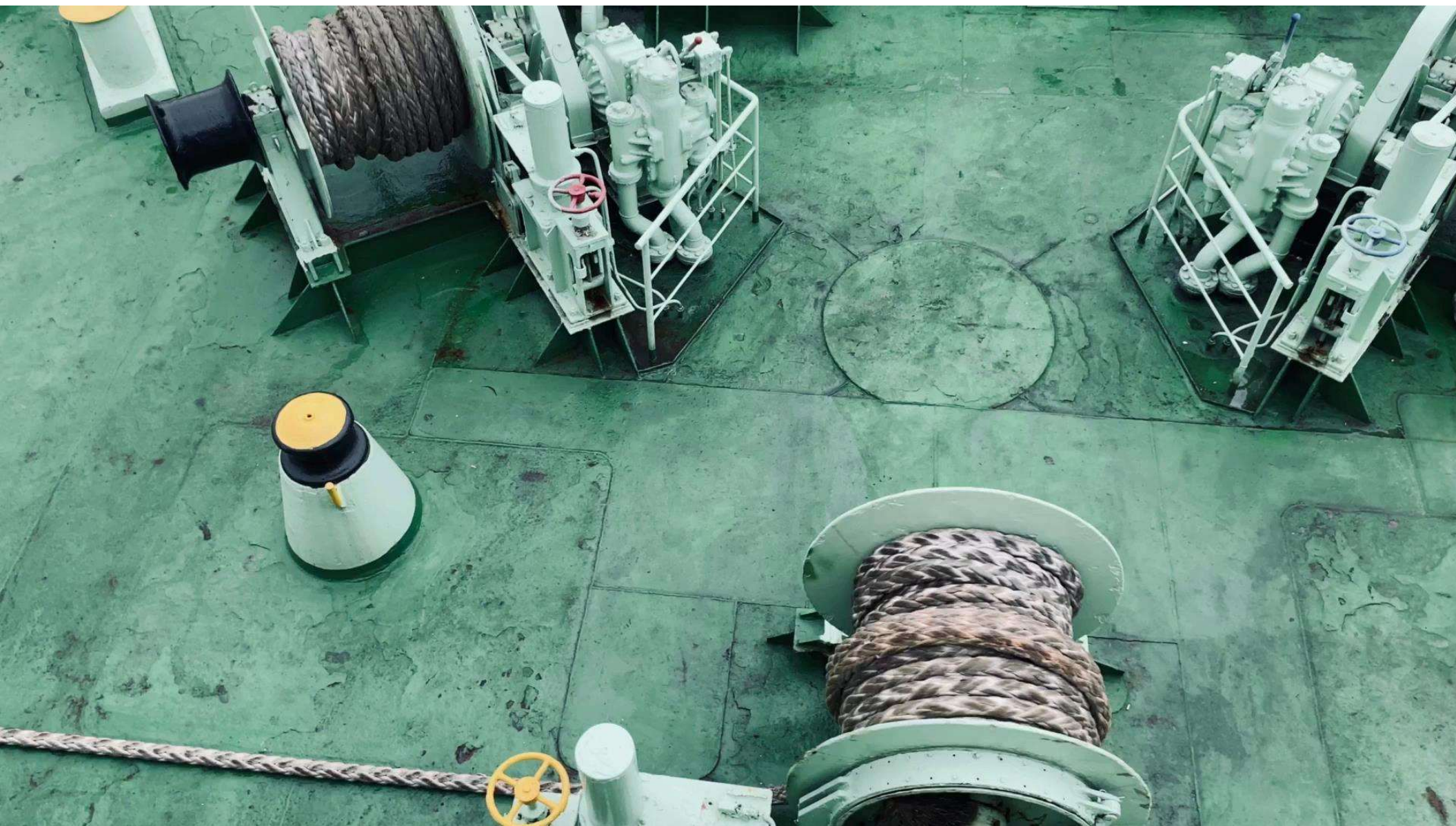
Human Centric Design Approach in Enhancing Mooring Safety

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Marine Engineer, DHI
PIANC APAC 2024



MARCH 6, 1987





A hand in a white shirt cuff reaches up from the bottom left towards the 'HCD' text. The background is dark blue with glowing particles.

HCD

ISO 9241 -
Putting people
at the heart
of the process

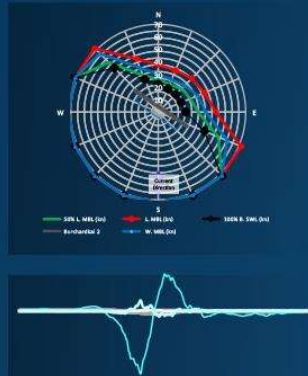
DESIGNING THE RIGHT THING



DESIGNING THINGS RIGHT

NCOS Mooring Analysis

SHIP MOTIONS IN 6 DOF



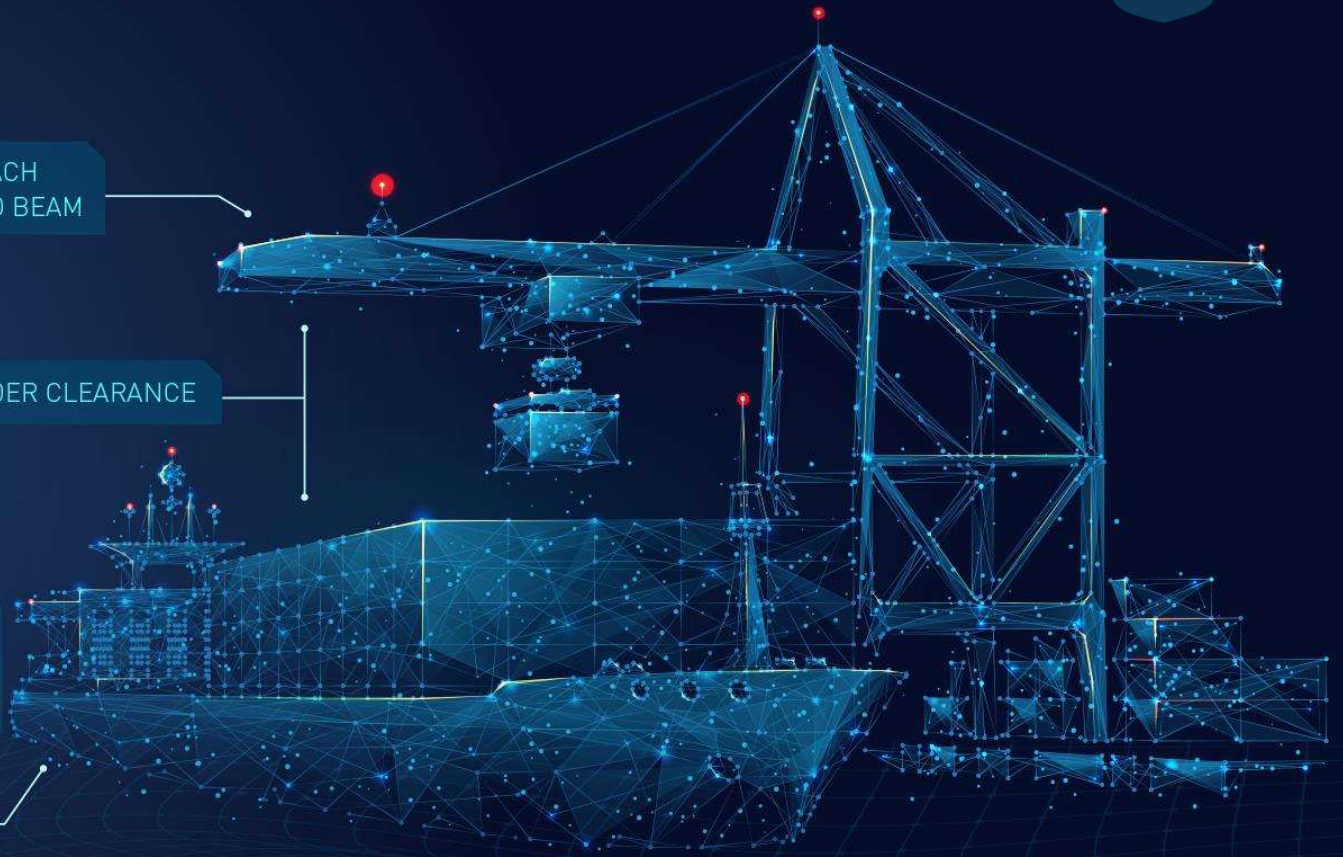
Wind Dir	50% L. MBL (kn)	L. MBL (kn)	100% B. SWL (kn)	W. BHC (kn)
22.5	>24kn (BFT6)	>30kn (BFT8)	>40kn (BFT9)	>29kn (BFT7)
45	>25kn (BFT6)	>30kn (BFT8)	>40kn (BFT9)	>30kn (BFT7)
67.5	>26kn (BFT7)	>40kn (BFT8)	>40kn (BFT9)	>34kn (BFT8)
90	>30kn (BFT7)	>40kn (BFT8)	>22kn (BFT6)	>30kn (BFT8)
112.5	>33kn (BFT10)	>70kn (BFT12)	>40kn (BFT9)	>36kn (BFT11)
135	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
157.5	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
180	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
202.5	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
225	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
247.5	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
270	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
292.5	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)	>70kn (BFT12)
315	>58kn (BFT11)	>70kn (BFT12)	>50kn (BFT10)	>66kn (BFT10)
337.5	>32kn (BFT7)	>40kn (BFT8)	>23kn (BFT7)	>38kn (BFT8)
360	>29kn (BFT6)	>30kn (BFT8)	>22kn (BFT6)	>30kn (BFT7)

OUTREACH BEYOND BEAM

SPREADER CLEARANCE

MOORING LINE, FENDER & BOLLARD FORCES

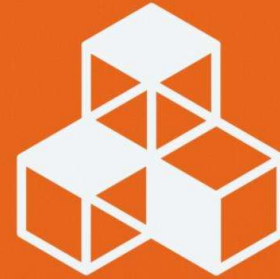
UKC @ BERTH



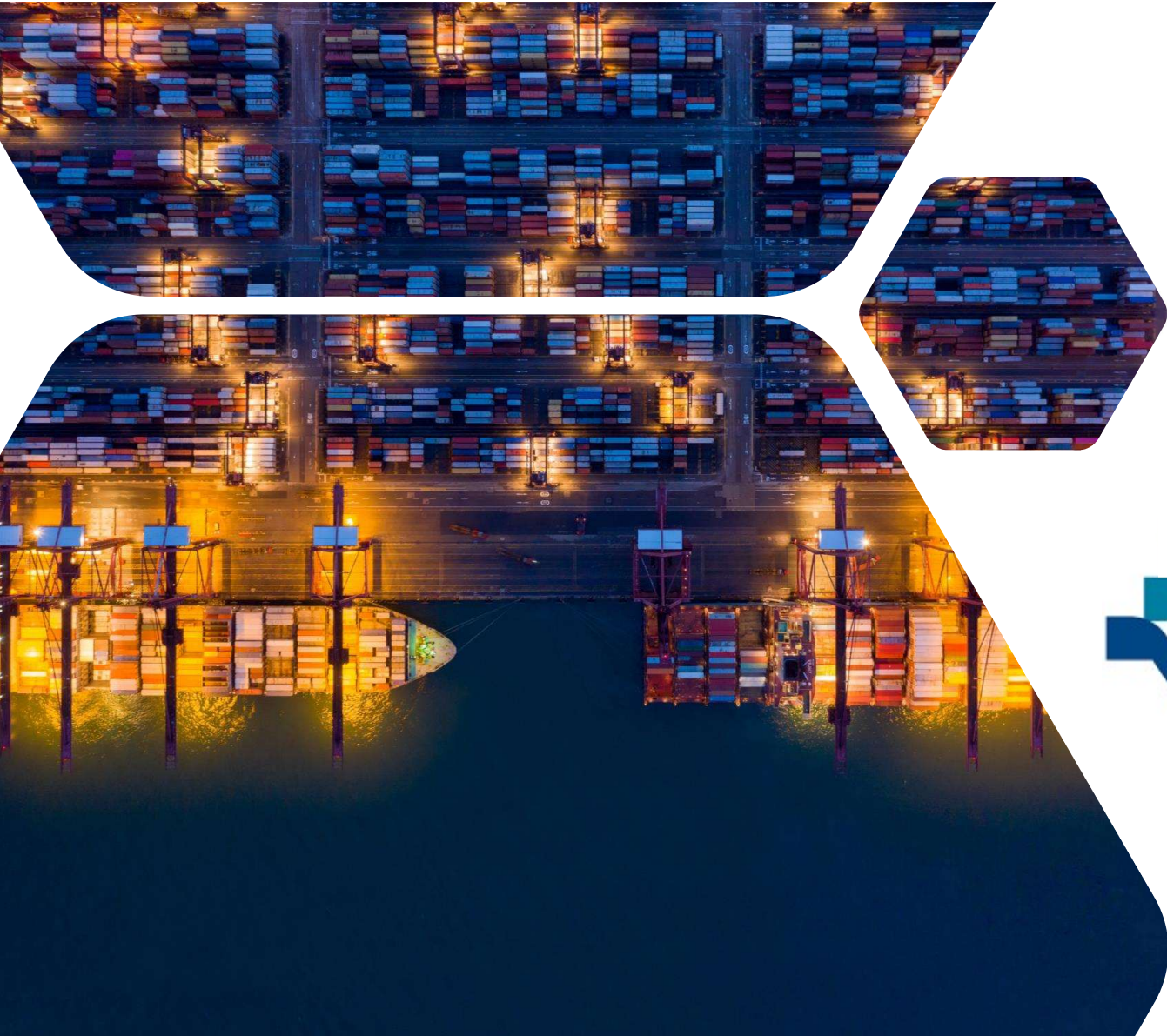
8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



 SUSTAINABLE
DEVELOPMENT **GOALS**



SOUTHERN PORTS
ALBANY BUNBURY ESPERANCE

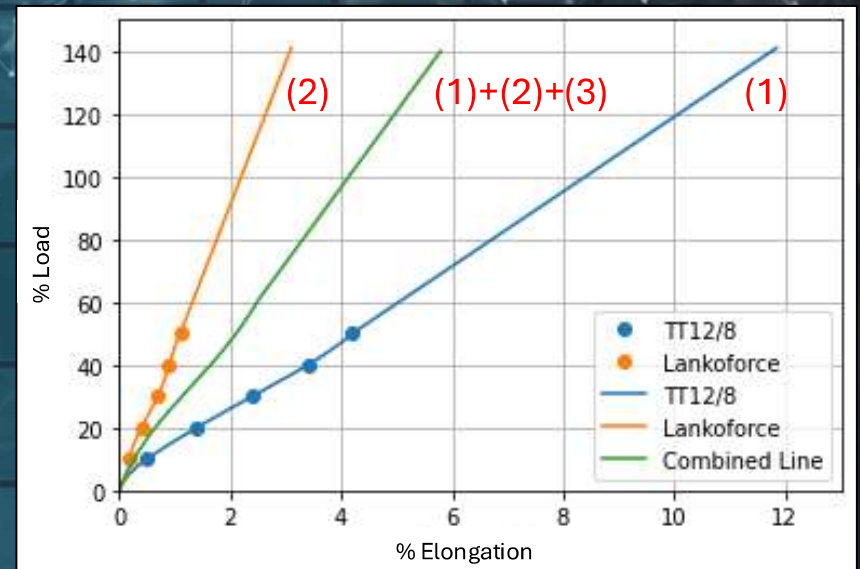
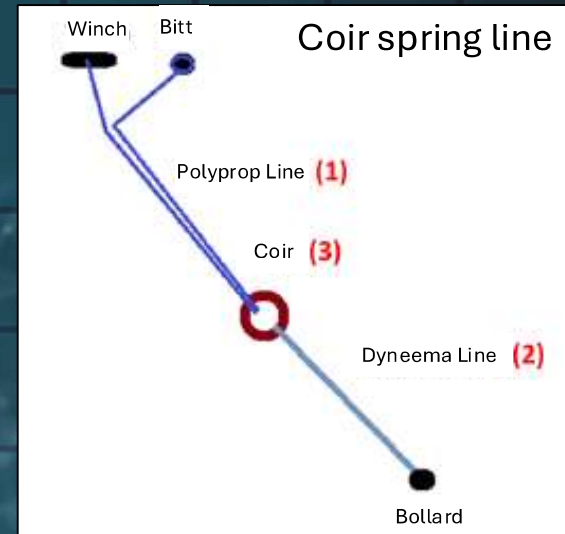


Fremantle
PORTS



SOUTHERN PORTS
ALBANY BUNBURY ESPERANCE

Mooring arrangement of a capesize bulk carrier

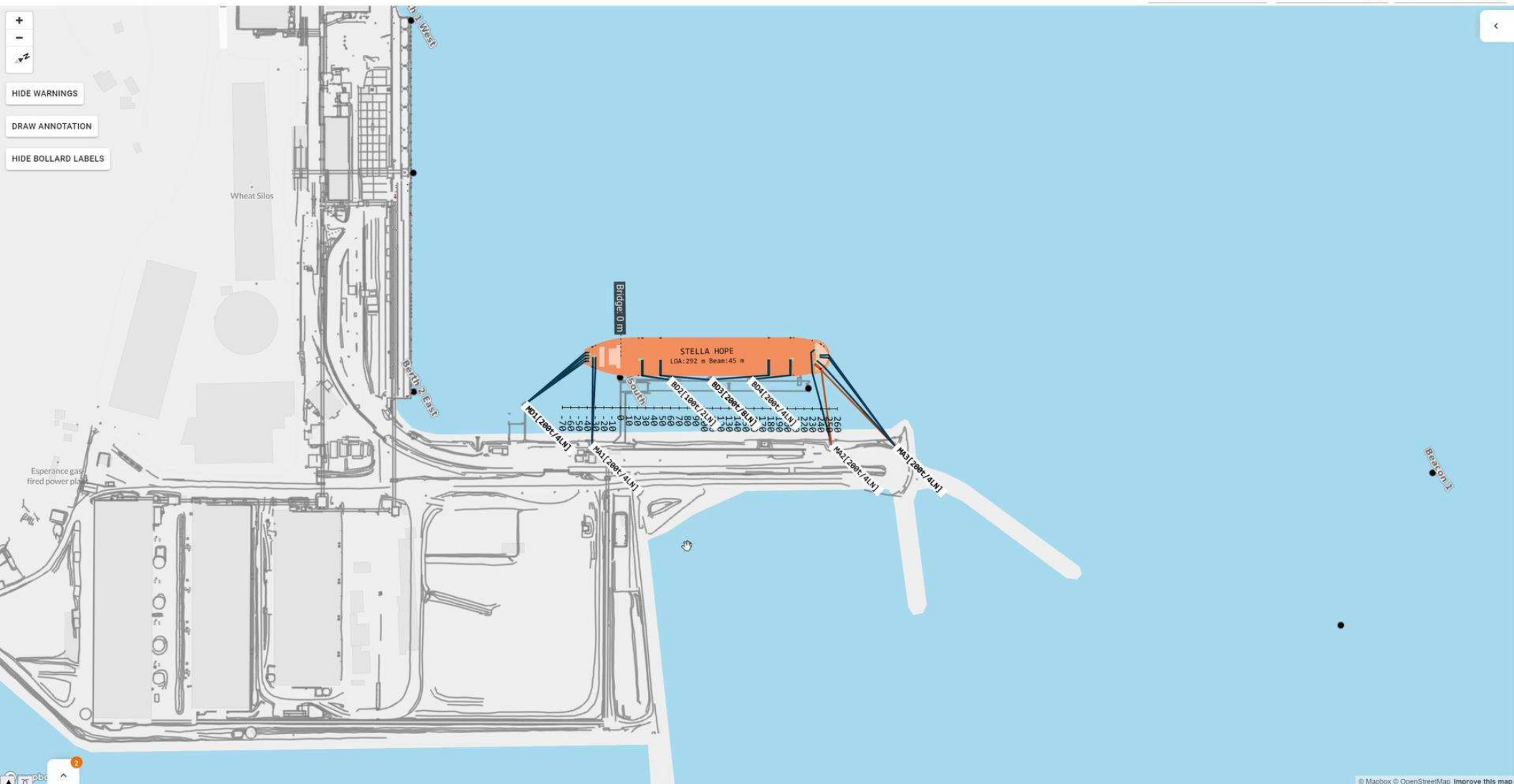




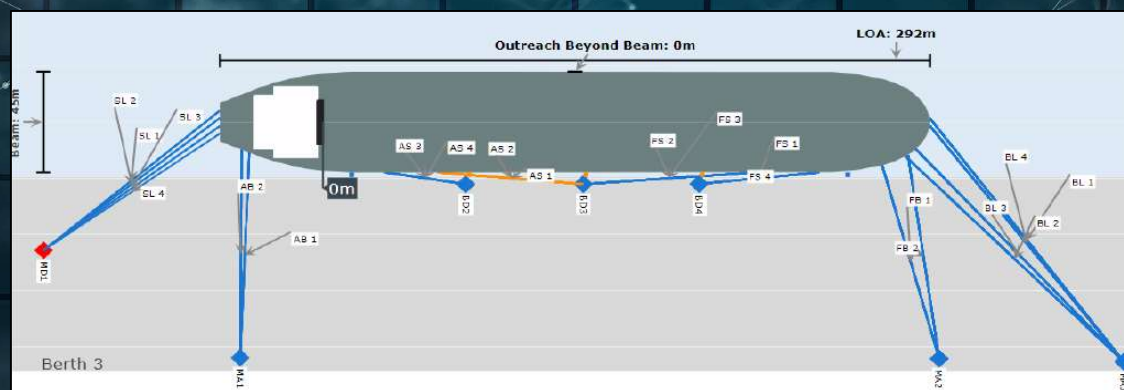
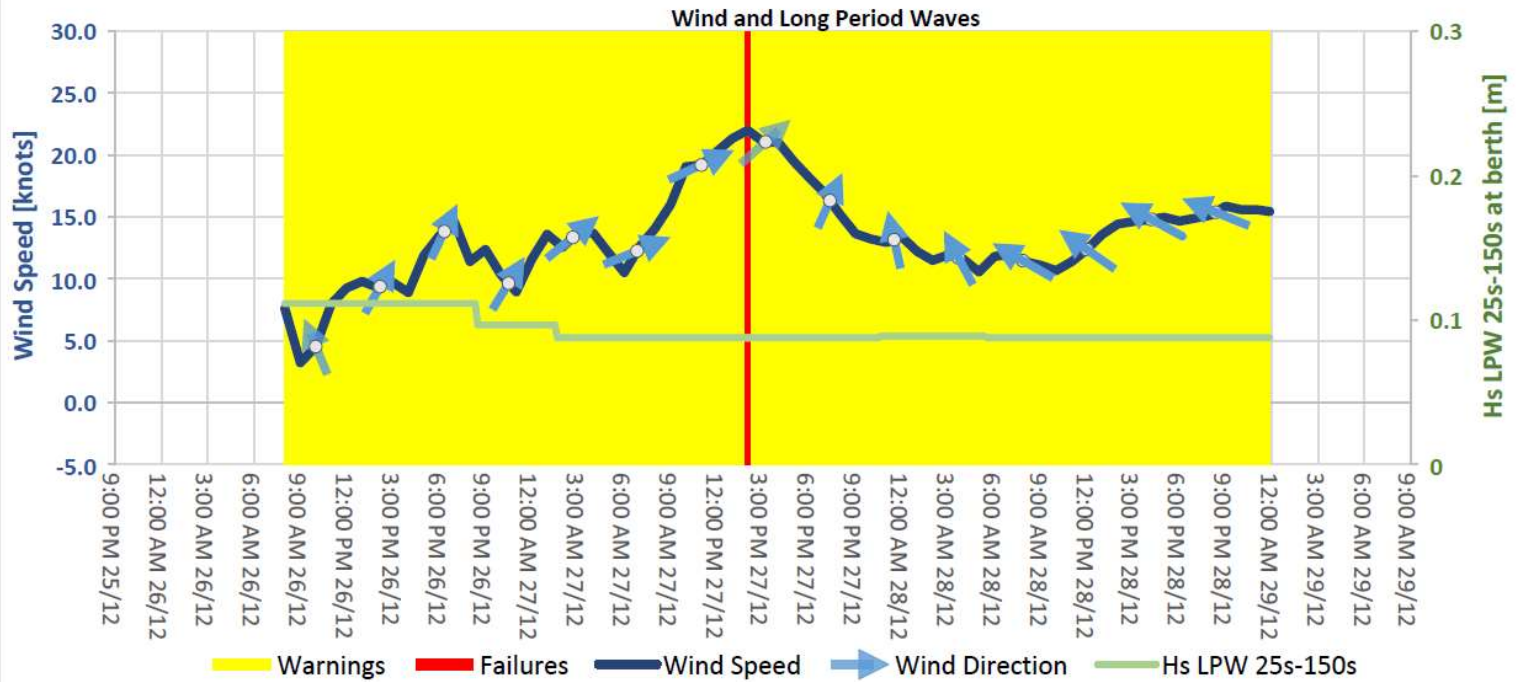
Go to
Berth 3

Start Date
01/12/2022

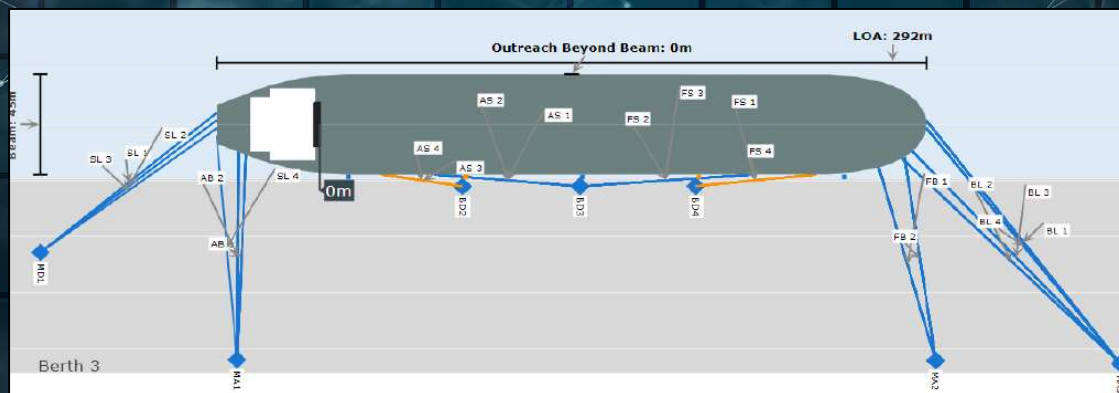
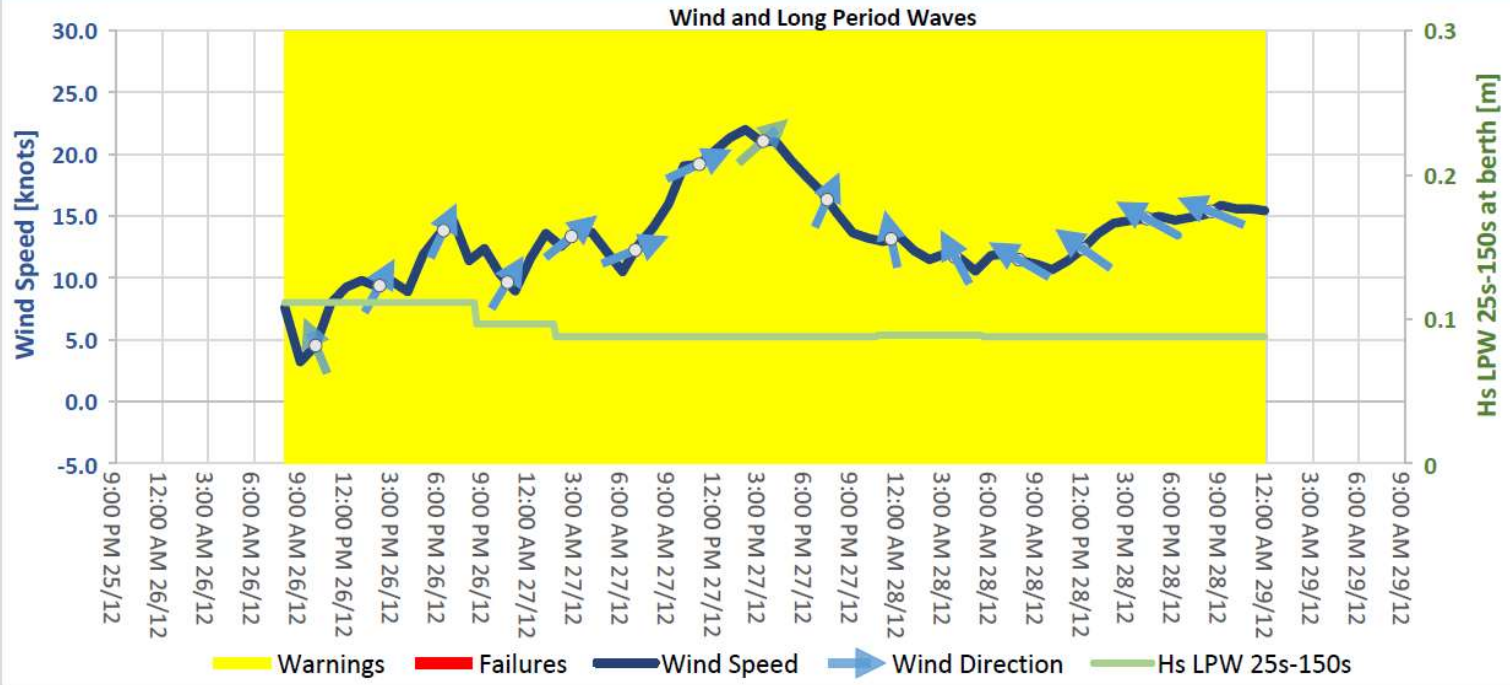
End Date
01/01/2023



Berth Plan Forecast Synopsis



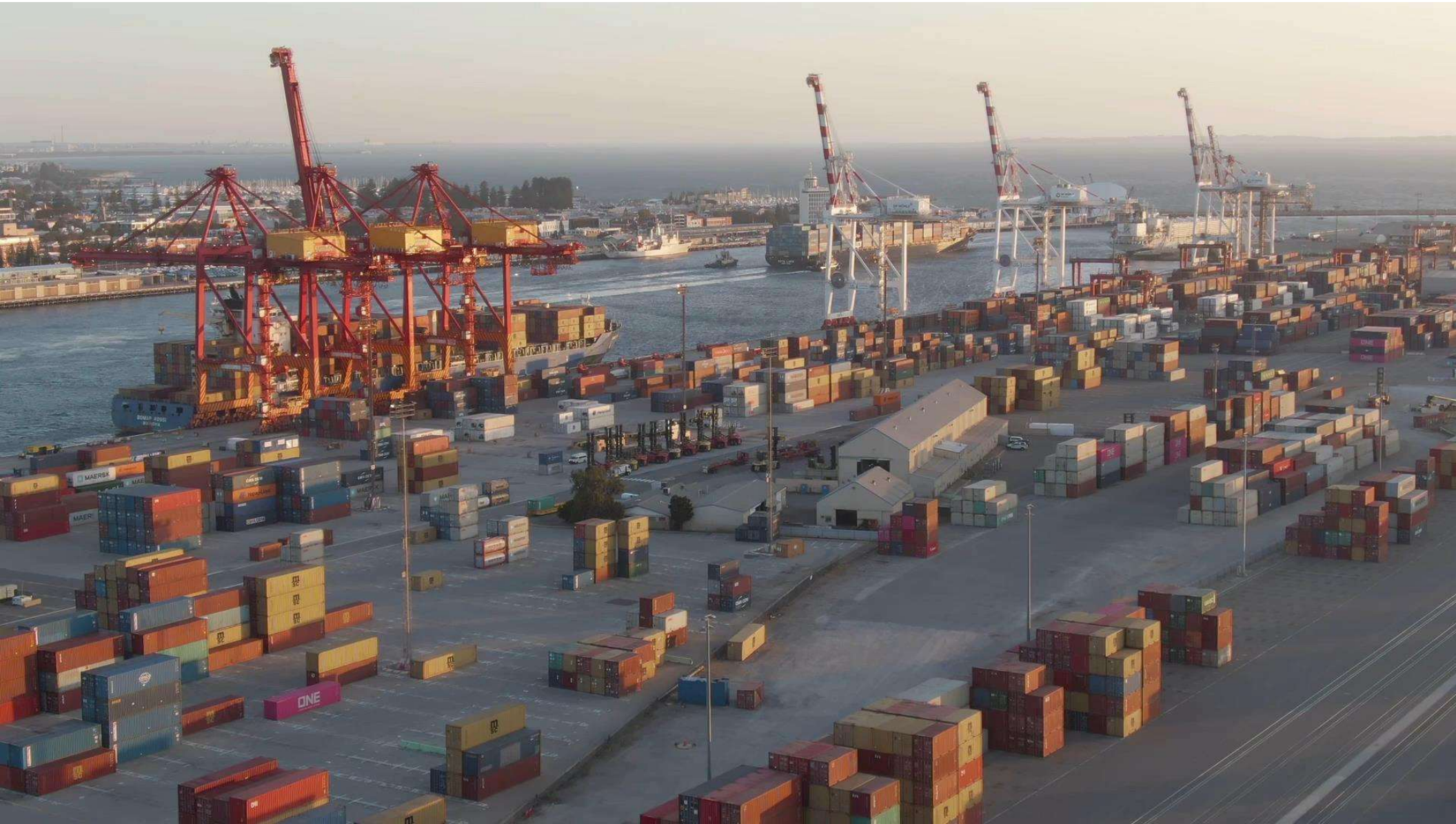
Berth Plan Forecast Synopsis



Key Lessons

1. Continual improvement is the key to lasting success
2. Analytic solutions empower decision makers
3. The journey is just as important as the process







Course Rating
☆☆☆☆

Users 19	Completed 7
Average score 99.5%	Average time 4h 48m

INDUSTRY

NCOS Mooring Analysis

EDIT MODE

This course provides an introduction to NCOS Mooring Analysis, a state of the art physics based decision support tool to improve mooring safety in port. The course is divided into two sections. The first features a general overview of NCOS Mooring Analysis including the demonstration of an example mooring simulation. In the second portion of the course...

Expand course description

LEVEL : BEGINNER COURSE FORMAT : SELF-PACED COURSE CITY LOCATION : ONLINE

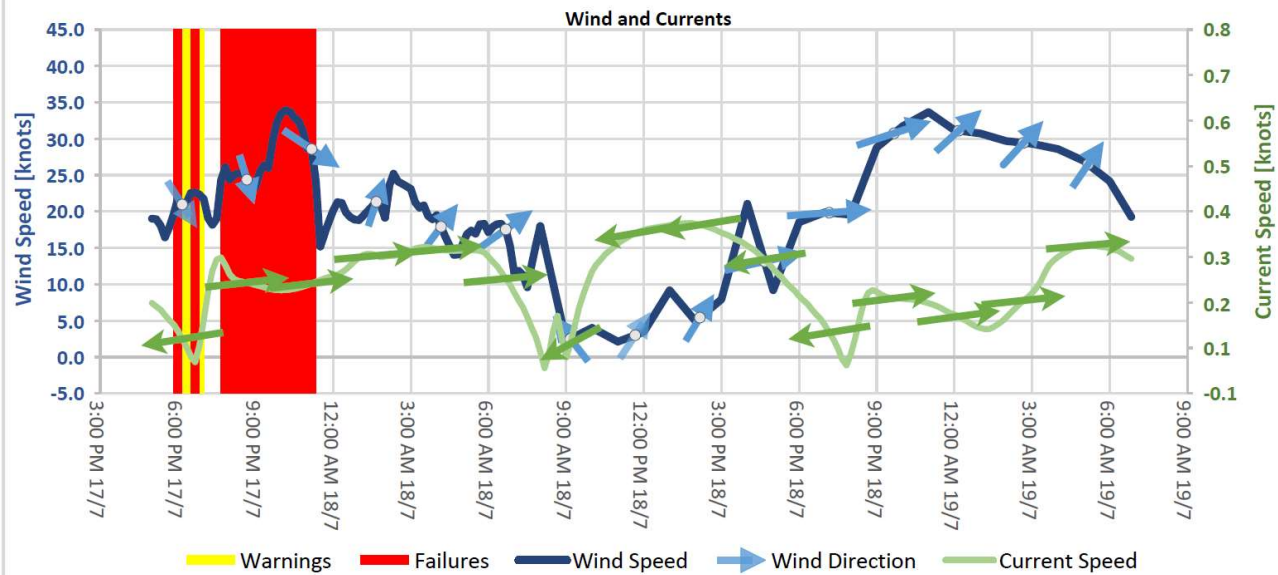
Course content

ADD CONTENT COURSE RULES

▼ NCOS Mooring Analysis	EDIT
Setting Up a Scenario	EDIT
Vessel Specification	EDIT
Berth Specification	EDIT
Mooring Warnings	EDIT
Mooring Refinements	EDIT
Environmental Forcings	EDIT
Scenario Handling and Result Access	EDIT

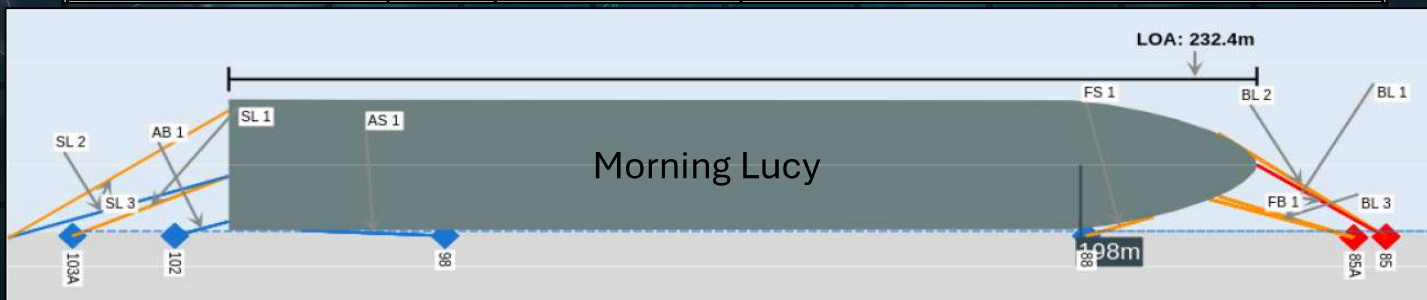


Berth Plan Forecast Synopsis



First 10 Mooring System Notifications

Item	Alert	First Occurrence	Details
85	Failure	6:00 PM 17 Jul 2024	H. bollard force (366t) is 366% of SWL (100t).
Fore Breast Line 1 - Winch	Failure	9:40 PM 17 Jul 2024	Winch force (120t) is 130% of Winch BHC (92t).
Fore Breast Line 1	Failure	9:50 PM 17 Jul 2024	Line force (120t) is 114% of L. MBL (105t).
Bow Line 2 - Winch	Failure	9:50 PM 17 Jul 2024	Winch force (159t) is 174% of Winch BHC (92t).
85A	Failure	9:50 PM 17 Jul 2024	H. bollard force (261t) is 261% of SWL (100t).





Go to

Berth 12

Start Date

09/08/2024

End Date

30/08/2024



SHOW WARNINGS

DRAW ANNOTATION

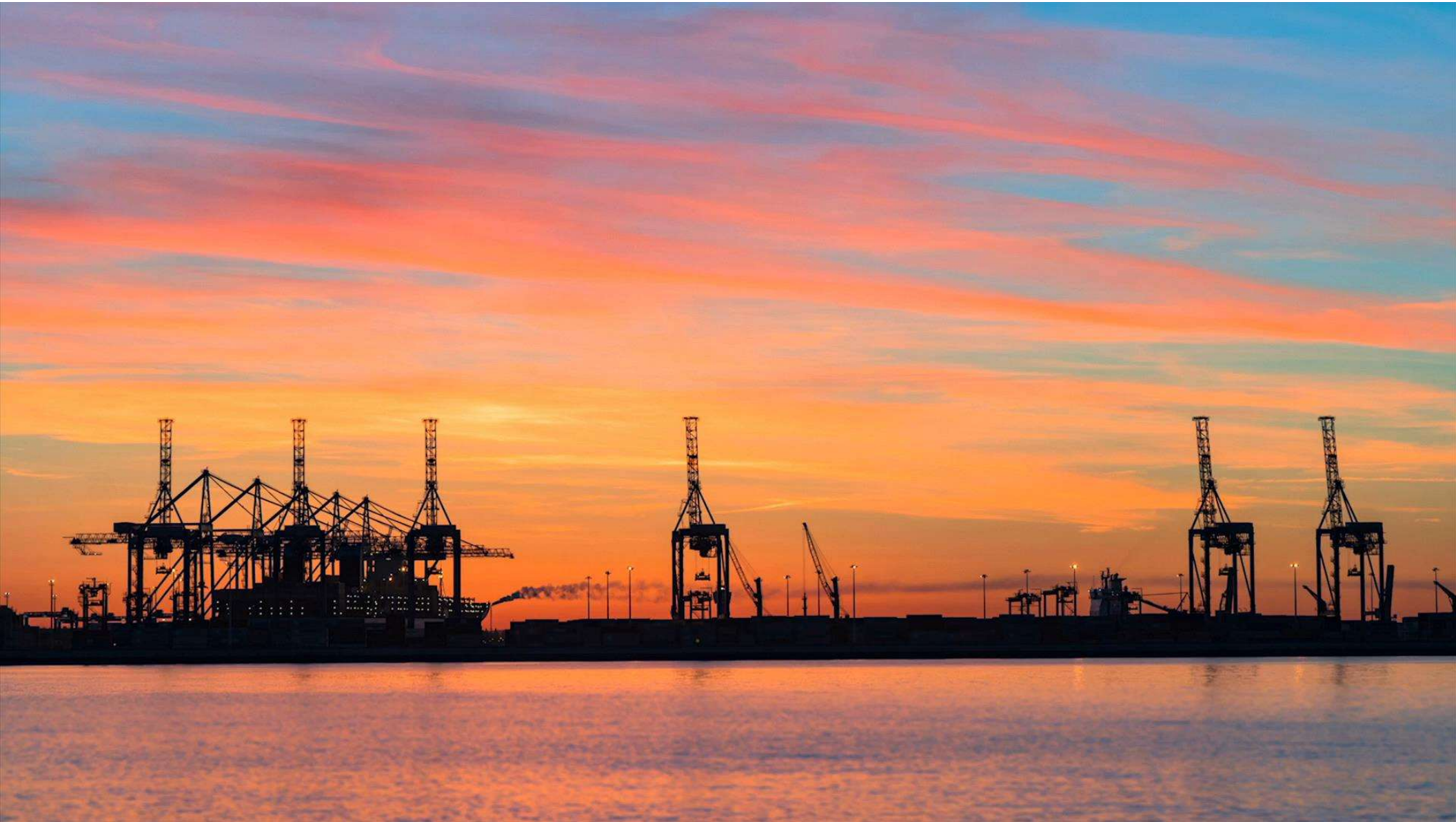
HIDE BOLLARD LABELS

Map navigation controls

Key Lessons

1. Implementation strategies are not one size fits all
2. Human centric design drives positive change
3. Technology supports human needs





THANK YOU

