A member of the "K" LINE Group

SAL HEAVY LIFT GMBH
Company Presentation

EMship+
Advanced Design

SAL

CONTENT

- Our Company
- Our Fleet
- Our Solutions
- Your Thesis

OUR COMPANY

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OUR COMPANY

- Founded in 1980
- Offices in 7 Countries on 4 continents
- Global coverage – exclusive agent representation in +20 countries

- 150 employees ashore
- 600 crew members

- Own fleet of 13 specialized heavy lift vessels
  + 2 long-term heavy lift time charters

- Highest HSEQ standards

- In-house engineering team

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SAL

OUR COMPANY

- 150 employees ashore
- 600 crew members

HEADQUARTERS

HAMBURG • GERMANY

WORLDWIDE

HOUSTON • USA
LONDON • UK
DELFT • NETHERLANDS
HELSINKI • FINLAND
SINGAPORE • SINGAPORE
PERTH • AUSTRALIA
SHANGHAI • CHINA
MANILA • PHILIPPINES
TOKYO • JAPAN

- Own fleet of 13 specialized heavy lift vessels
  + 2 long-term heavy lift time charters

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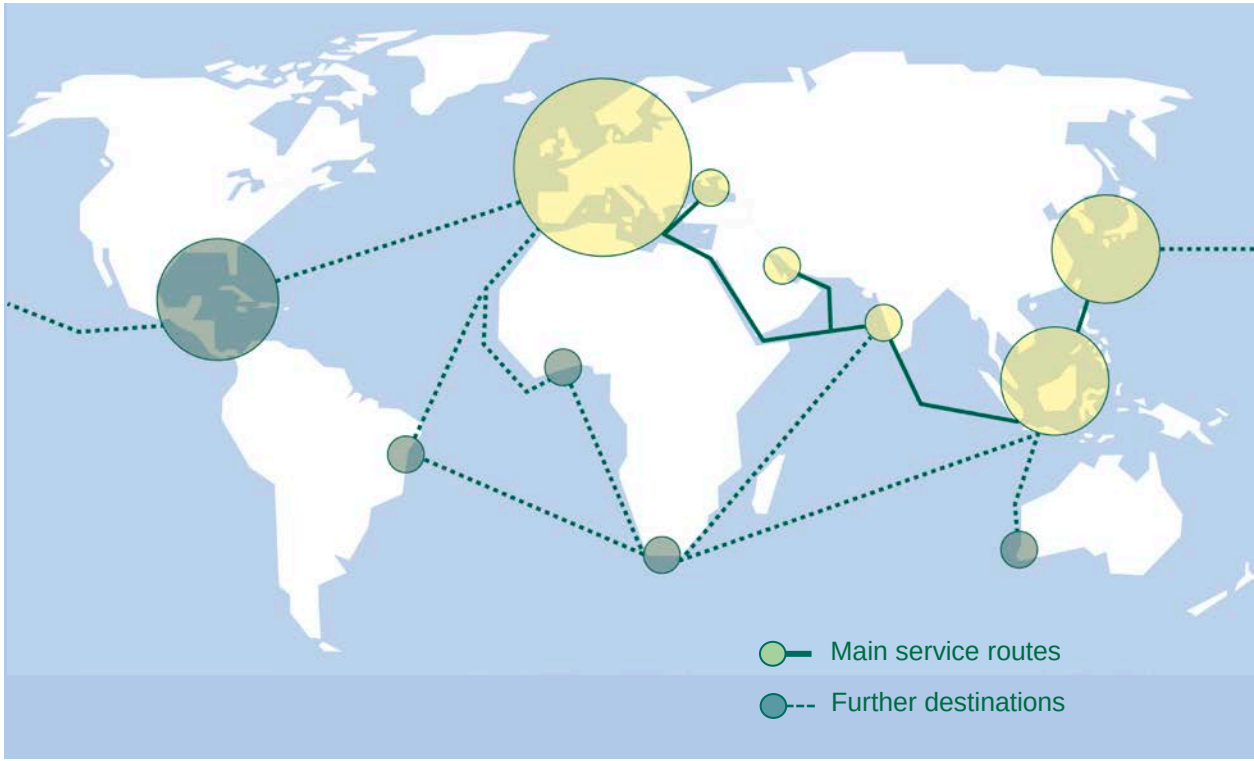
OUR TRADELINES

Semi-Liner / Project Service

- Main service route: Europe to Asia via Middle East
- 2–3 sailings per month each direction

Further destinations sub inducement:

- Australia
- West Africa
- North America
- South America



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OUR FLEET

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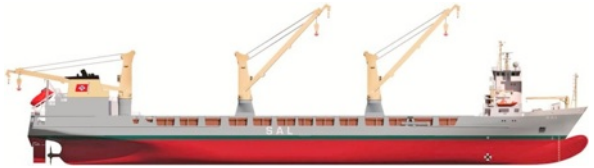
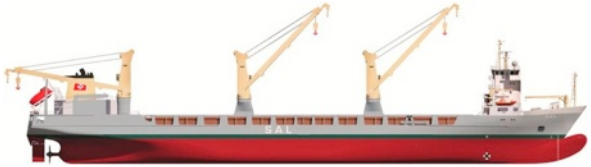
OUR FLEET

Type 183
L 160 m • B 27 m • LC 2 x 1000 t SWL – comb. to 2000 t • DP 1 & 2

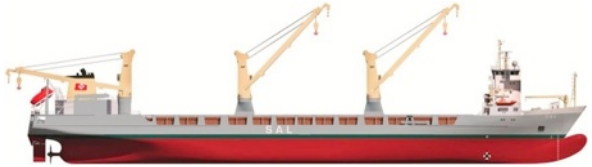
Type 176
L 160 m • B 24 m • LC 2 x 700 t SWL – comb. to 1400 t + 1 crane 350 t SWL



Type 161B
L 151 m • B 21m • LC 2 x 350 t SWL – comb. to 700 t + 1 crane 250 t SWL



Type 161A
L 151 m • B 21m • LC 2 x 320 t SWL – comb. to 640 t + 1 crane 200 t SWL



Type 161
L 151 m • B 20.5 m • LC 2 x 275 t SWL – comb. to 550 t + 1 crane 150 t SWL

Type 116
L 133 m • B 23 m • LC 2 x 450 t SWL – comb. to 900 t | • Ice class GL E3 / Swedish 1A

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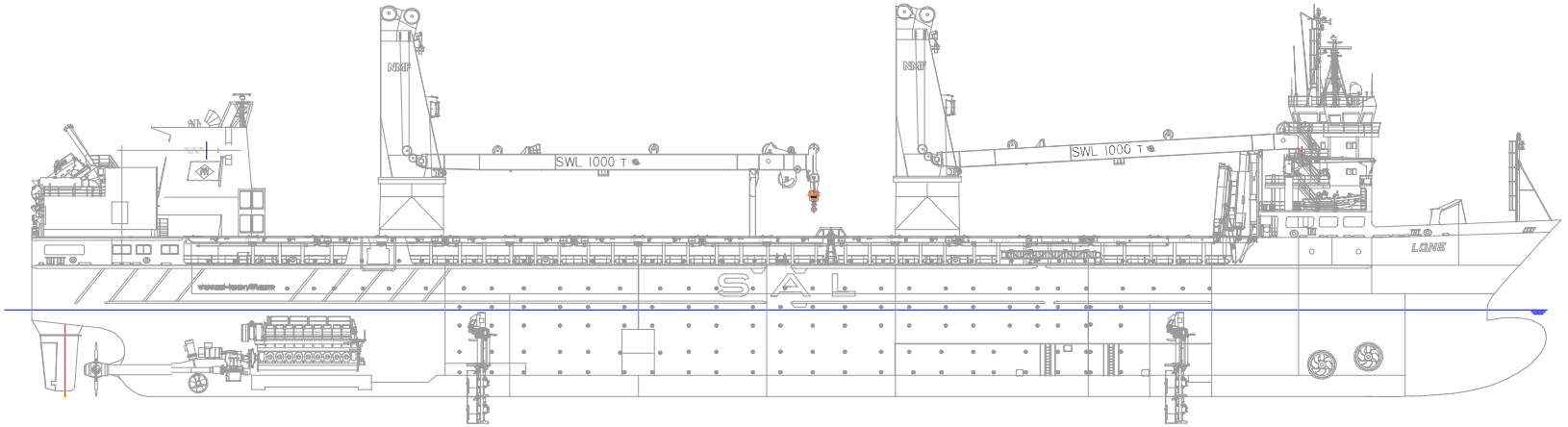
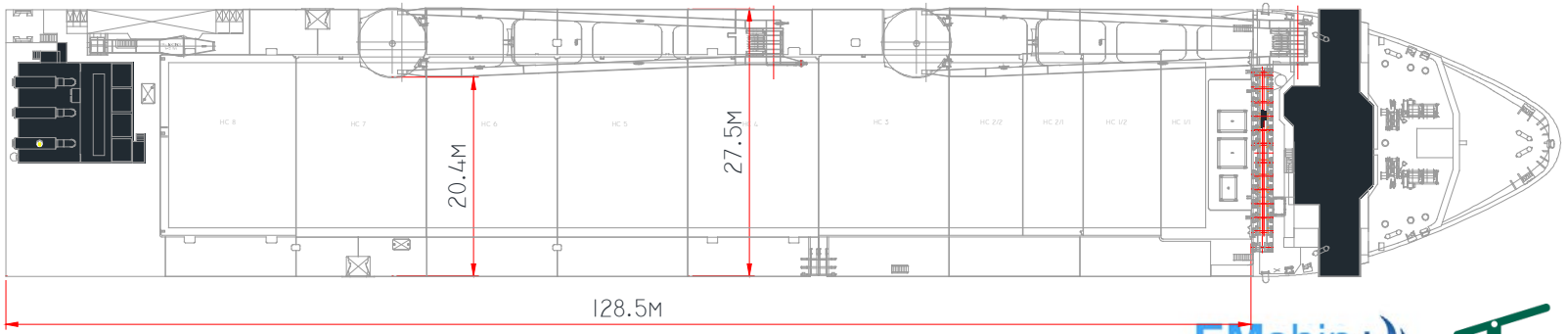
SAL TYPE 183





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11
12
14

OUR ENGINEERING

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OUR ENGINEERING

- In-house engineering teams
- Custom-made solutions
- Fully documented solutions
- CAD modelling in 2D and 3D
- FE analyses and design of sea fastening, deck and support structures
- Planning of weather-restriced sea transport and weight-critical cargo incl. on-board motion monitoring
- Ship motion studies, dynamic lift analysis, installation and mooring analysis

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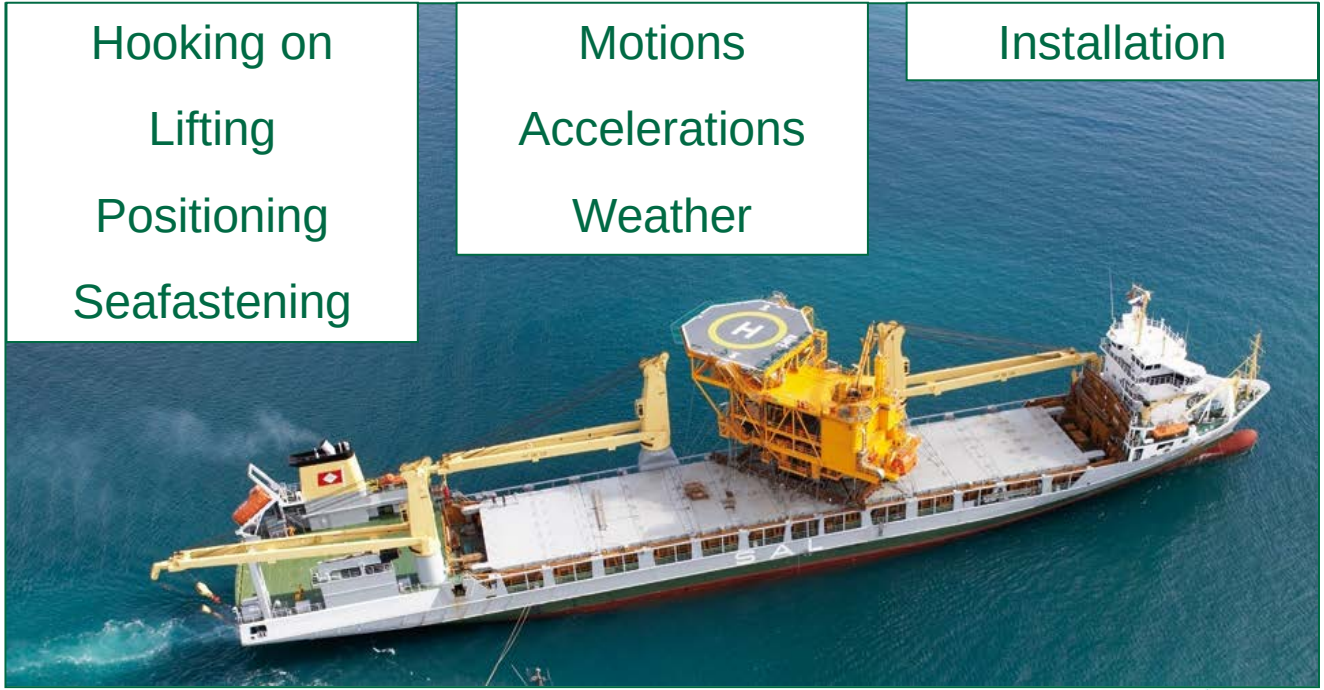
PHASES OF A HEAVY LIFT SHIPMENT

Planning / Preparation

Loading	Transport	Discharging
Hooking on Lifting Positioning Seafastening	Motions Accelerations Weather	Installation



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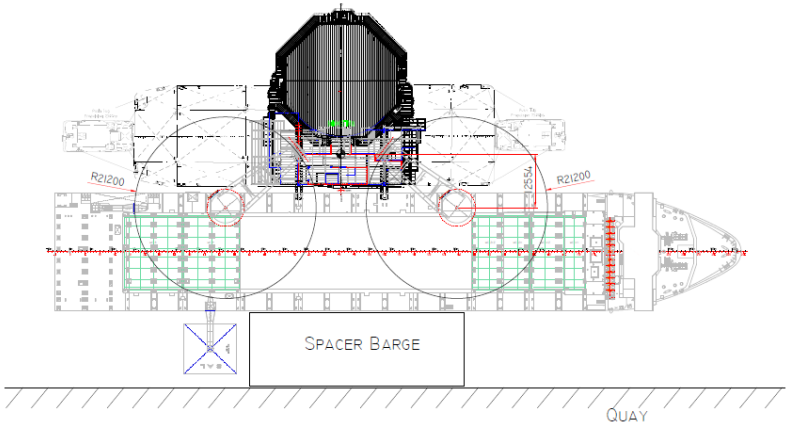
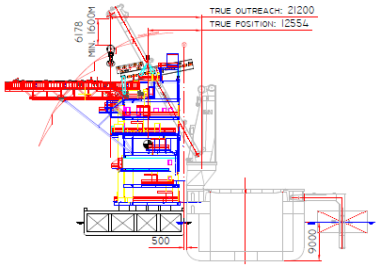
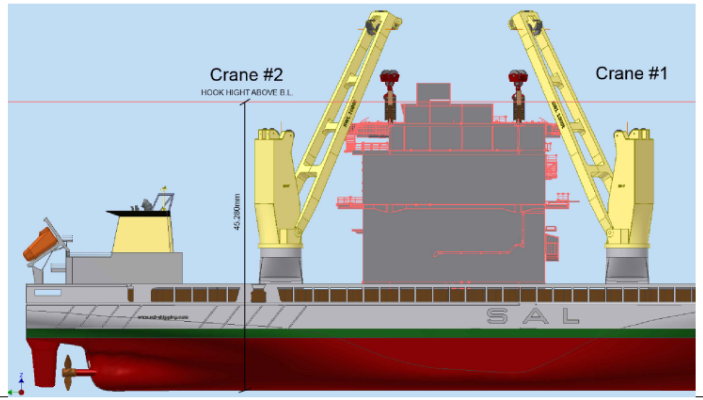
TRANSPORT PLANNING







REMARKS:

- STRUCTURE ACC. SAL DRAWING "2013 XXX #405 REMOVALS" HAS TO BE REMOVED PRIOR LIFTING.
- PLEASE CHECK IF THE SHOWN SHAPE OF CARGO MEETS THE ACTUAL CONDITION DURING LIFTING/TRANSPORT.
- SUBJECT TO MASTERS DISCRETION ON SITE.

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
04	2013-07-03	COUNTERWEIGHT ADDED	HRT	NVB	
03	2013-07-02	RIGGING UPDATED, LC3 POSITION UPDATED	HRT	NVB	
02	2013-06-26	UPDATED WITH HOOK HEIGHTS OF SHACKLE - RIGGING HEIGHT UPDATED	HRT	NAP	
01	2013-06-25	RIGGING UPDATED - LIFTING HEIGHT ADJUSTED	HRT	NVB	
00	2013-06-22	ISSUED FOR DISCUSSION ONLY	HRT	NVB	

SAL HEAVY LIFT GMBH
BROOKTORKAI 20
20457 HAMBURG GERMANY

SHIPMENT: LIVING QUARTER
VESSEL: MV SVENJA
SCALE: 1:00842

LIFTING PROCEDURE 1
LIFTING FROM BARGE

DOCUMENT NO:
2013 181 #405
LIFTING PROCEDURE 1 R04

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STRUCTUAL DESIGN & CALCULATIONS

LC5

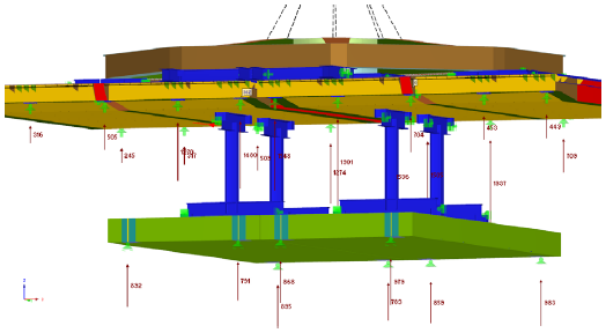


Figure 47: WD-Panels Reaction Forces [kN] LC5
Max Force = 1937 kN < 2200 kN
Max Force at TWD-Panels = 983 kN < 1661 kN

LC9

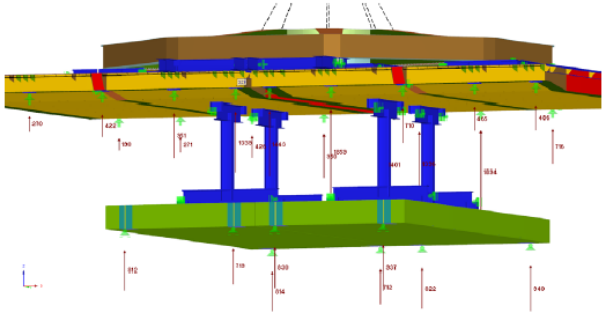
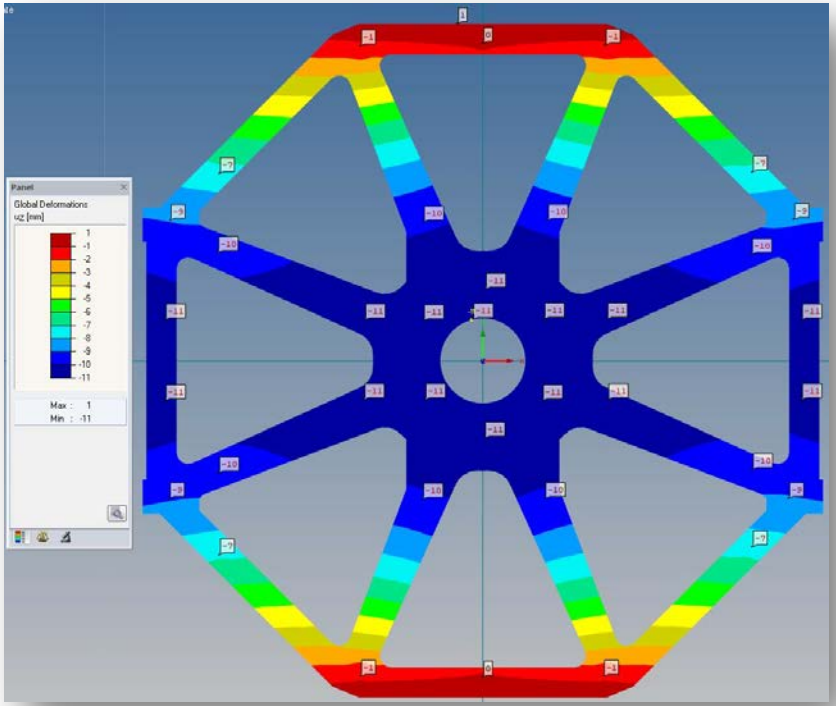


Figure 48: WD-Panels Reaction Forces [kN] LC9
Max Force = 1937 kN < 2200 kN
Max Force at TWD-Panels = 937 kN < 1661 kN



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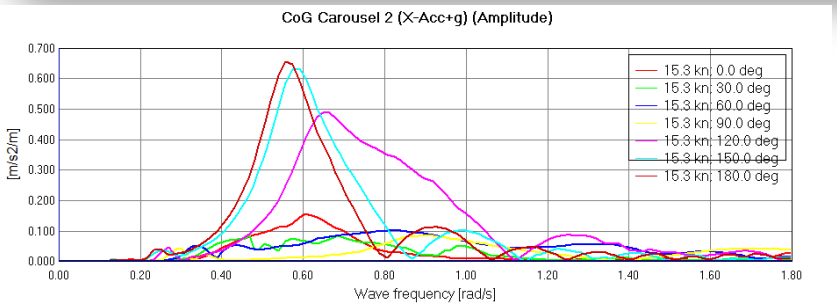
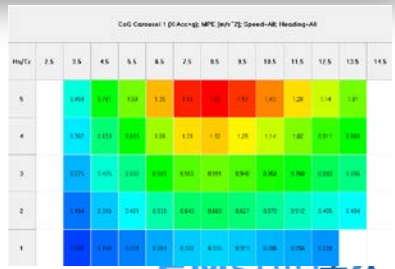
ROUTE ASSESSMENT – MOTION ANALYSES





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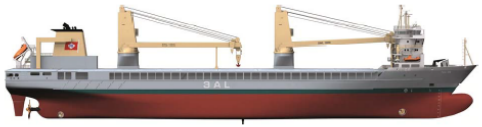
DOCUMENTATION

SAL
A member of the NYK Line Group

OPERATIONS MANUAL

Valemon LQ Project
Living Quarter
Rotterdam – Geoje

Document No. OPM 2013 181 #405 rev.2.docx
Revision 2
Date 3 July 2013



MV "Svenja"
Sietas yard type 183

An engineering solution for

Statoil, Hertel

SAL Heavy Lift GmbH • Brooktorkai 20 • 20457 Hamburg/Germany • Phone +49 (0) 40 360360-0 • www.sal-heavylift.com

CONTENT

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OUR SOLUTIONS

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VEJA MATE – TP TRANSPORTATION

Vessel	MV Trina
Weight	366 t
Dimensions	13.1 x 9.6 x 22.2m
Client	OWF
POL	Aalborg, Denmark
POD	Eemshaven, Netherlands
Specials	• specialized grillage with clamping system • purpose built TP-Lifting-Tool • Open top sailing • 12 (+1) consecutive voyages

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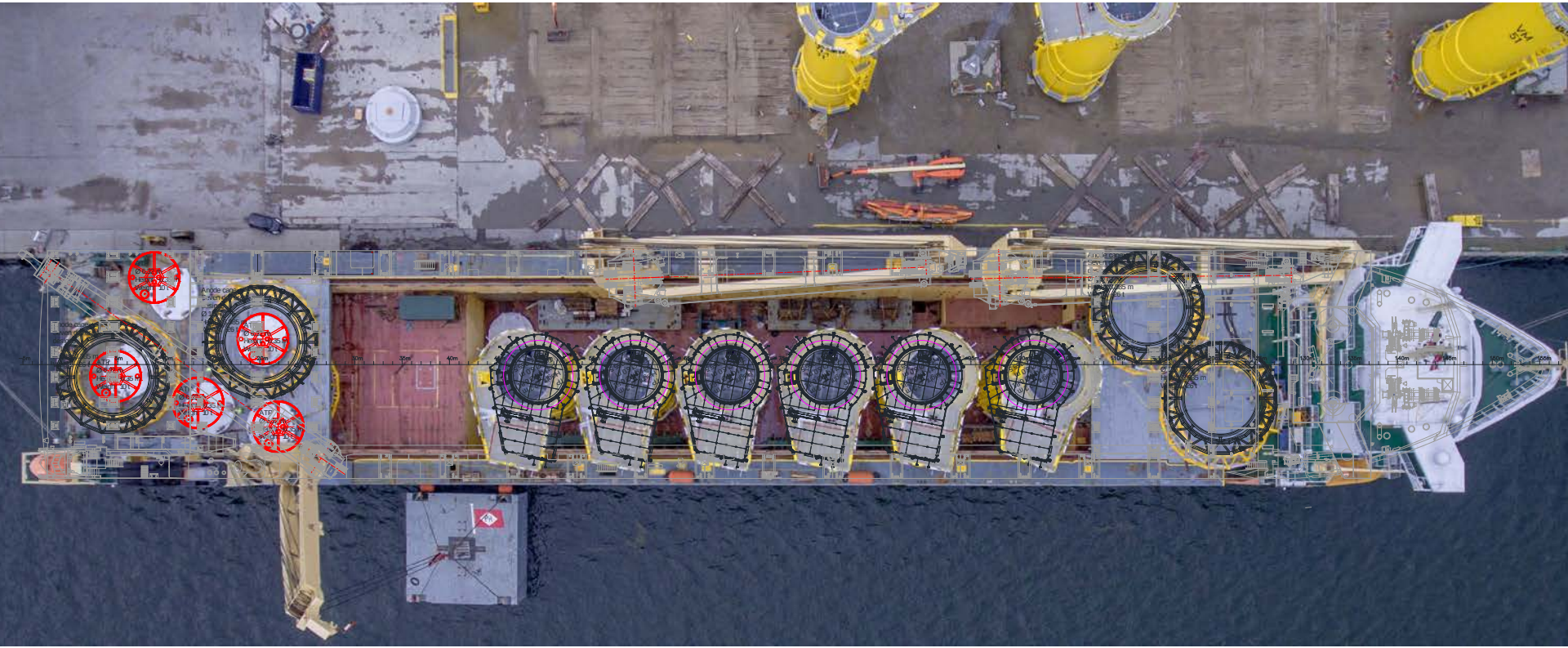
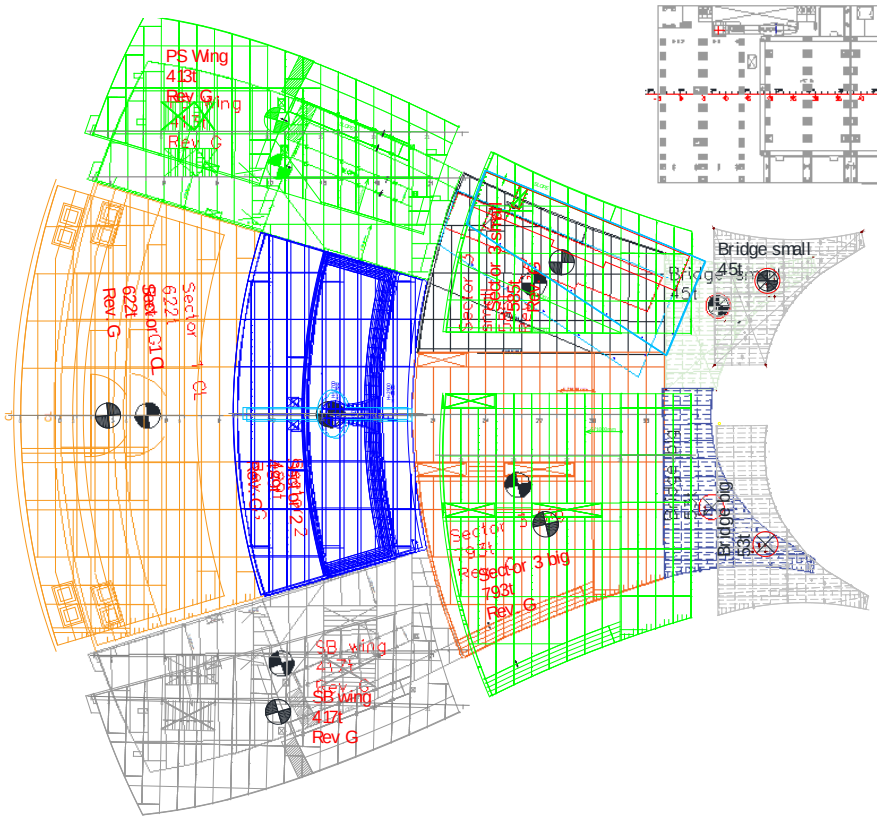
VEJA MATE – TP TRANSPORTATION

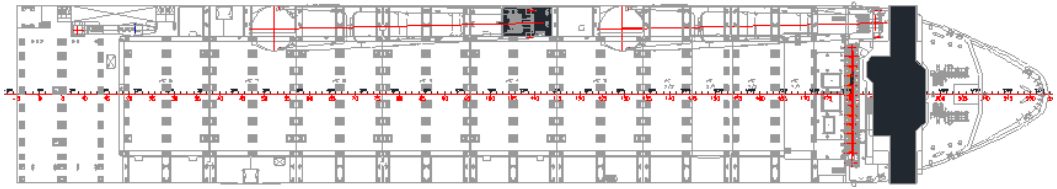


BURJ AL ARAB TERRACE

Vessel	MV Svenja
Weight	Up to 740 t
Dimensions	Up to 79 x 35 x 4 m
POL	Rauma, Finland
POD	Dubai, UAE
Specials	• 8 pieces of cargo, total weight: 3252 t • Heaviest piece: 740 t, 55 x 44 x 4 m • Biggest piece: 640 t, 79 x 35 x 4 m • Overhang of 16.2 m (aft), 15.0 m (starboard), 9.1 m (portside)

BEACH PLATFORMS FINLAND-DUBAI





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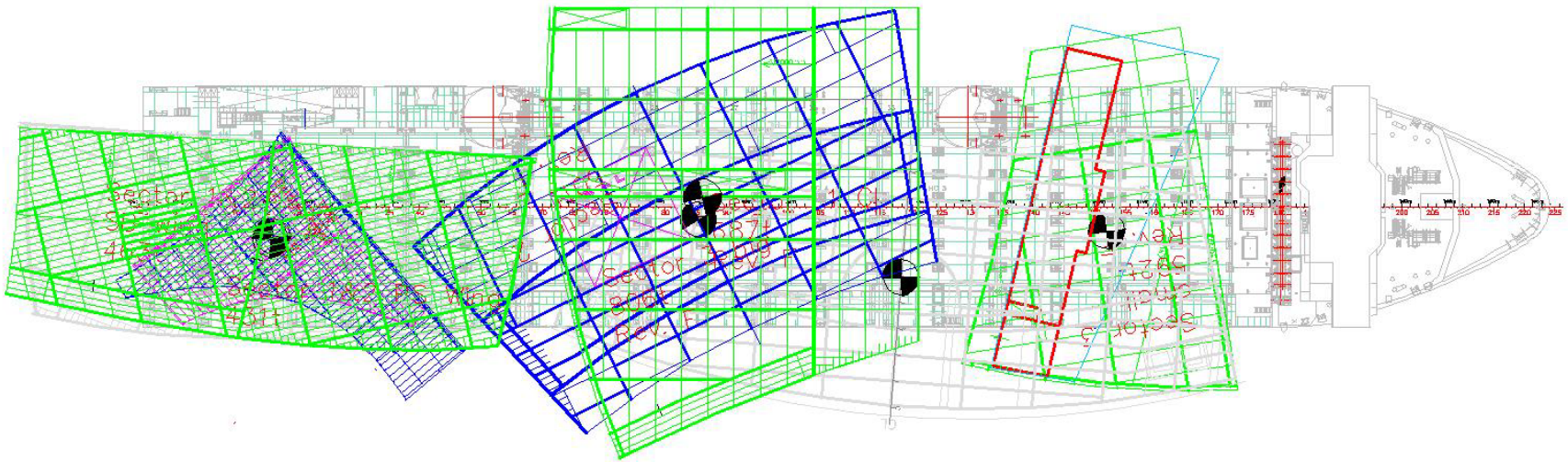
BEACH PLATFORMS FINLAND-DUBAI



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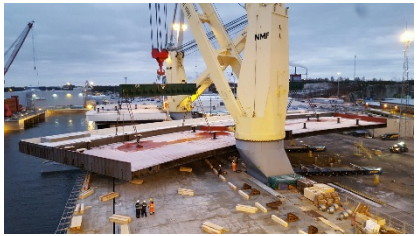
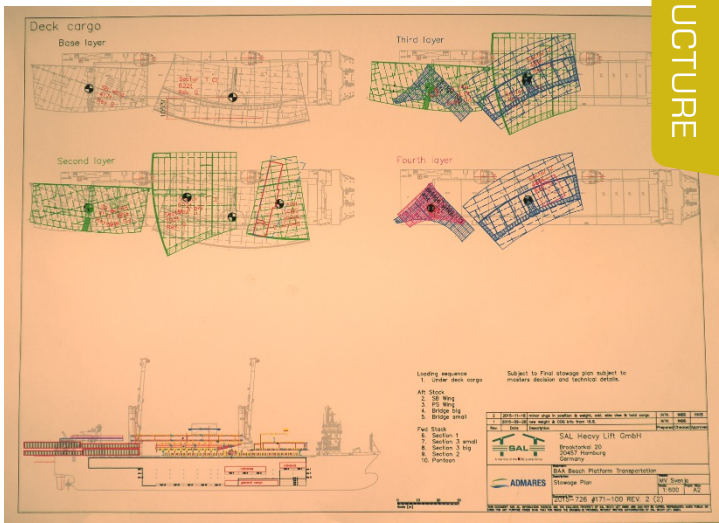
PROJECT IMPRESSIONS





INFRASTRUCTURE

PROJECT PLATFORM INSTALLATION

Project	Kitchen Lights Unit
Vessel	MV Svenja
Weight	1100 t Monopod
Client-provided item (CPI)	Monopod, Project Platform and Helideck
Location	Cook Inlet, Alaska
Specials	• Lift and installation of Monopod • Piling • Lift and installation of Project Platform and Helideck

OIL & GAS

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PROJECT IMPRESSIONS

OIL & GAS

YOUR THESIS

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Master Thesis − TOPICS

1. Design of hatch cover for heavy cargo using RFEM / POSEIDON
   - New HC to be integrated in HLV in service
   - Alternatively, design of HC supports, i.e. stanchions on the double bottom
2. Integration of a roll damping plate into the hull of a large heavy lift vessel considering “Sudden Loss of Crane Load Criteria”
3. Development of a voyage-specific damage stability calculation method to prove IMO's SPS compliance
4. Elaboration of lifting criteria for complex lifts of a heavy lift vessel

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WEIGHT DISTRIBUTION – CUSTOM SOLUTION

DRILLING RIG – APPR. 1100T

1. Design of hatch cover for heavy cargo using RFEM / POSEIDON

- Determination of loads acting on cargo / deck and their combinations
- Prepare FE model of ship's structure and hatch cover (system)
- Develop HL hatch cover / stanchion system and perform strength verifications
- Develop software tool for 'plug&play'
- Determination of required approval / certification processes

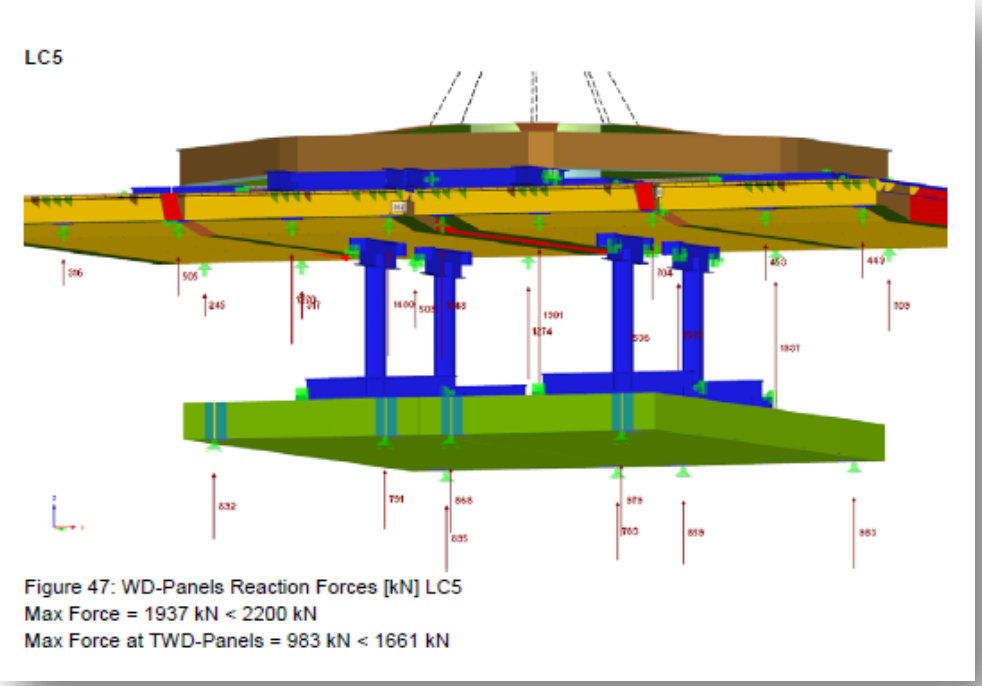
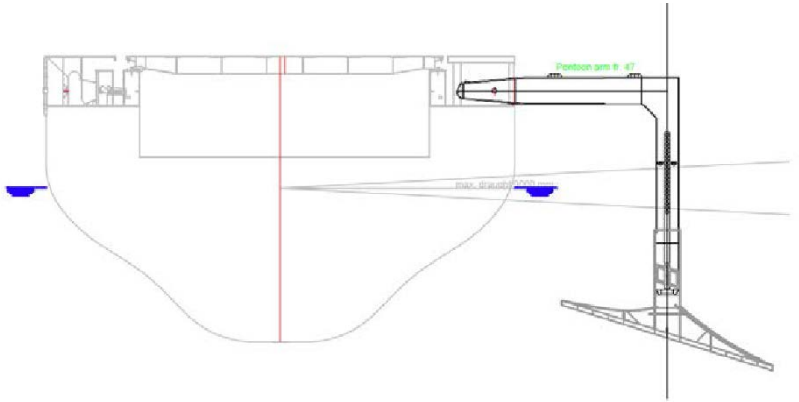


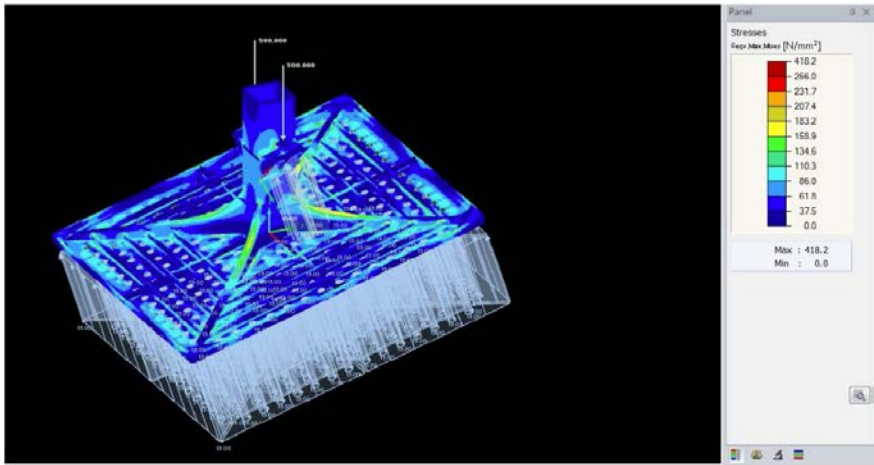
Figure 47: WD-Panels Reaction Forces [kN] LC5
Max Force = 1937 kN < 2200 kN
Max Force at TWD-Panels = 983 kN < 1661 kN

2. Integration of a roll damping plate into the hull of a large heavy lift vessel considering “Sudden Loss of Crane Load Criteria”

Damping plate designed by Nikhil Mathew for 183 type HLV

- So far designed for about 15° roll.
- Determination of loads acting on the plate after sudden loss of crane load with overshoot angles up to about 40° .
- Prepare RFEM model of supporting ship hull structure and arm
- Perform buckling strength and ultimate strength checks of the system plate-arm-hull

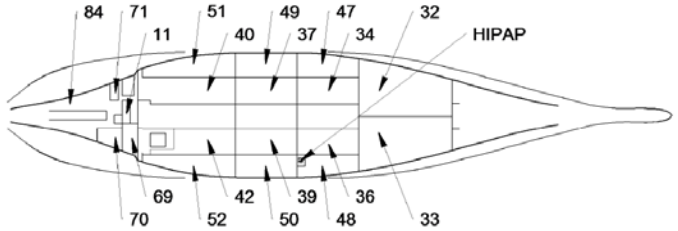




3. Development of a voyage-specific damage stability calculation method to prove IMO's SPS compliance

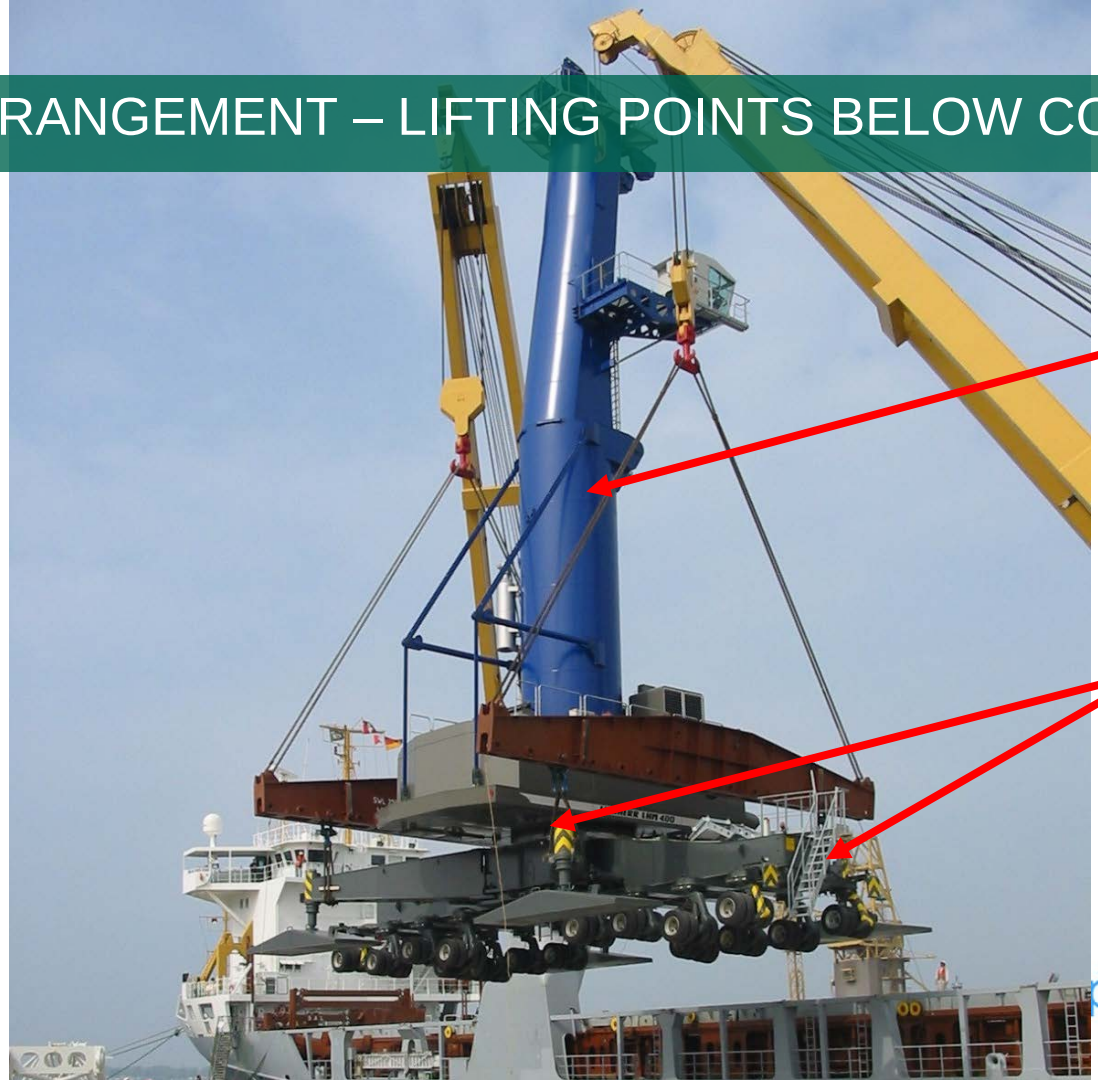
- Offshore projects require increased number of personnel onboard MV LONE
  - ➢ Special Purpose Ship safety certificate recently issued
  - ➢ Aggravated damage stability requirements raised minimum GM to 1.9 m for closed hold status
  - ➢ Minimum GM represents envelope GM for three drafts:
    1. Deepest subdivision draft
    2. Partial subdivision draft
    3. Light service draft

The bottom damage stability calculation was carried out for 35 combinations of damaged compartments. The figure below shows the labeling of the different compartments.



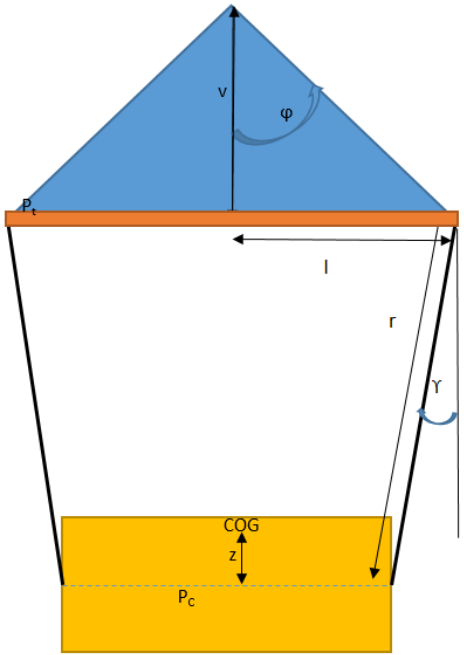
- Target is to reduce minimum GM
  - ➢ Elaboration of alternative method to prove SPS compliance
  - – Idea: Damage stability calculations restricted to voyage-specific loading conditions on
    - Departure
    - Open sea
    - Arrival

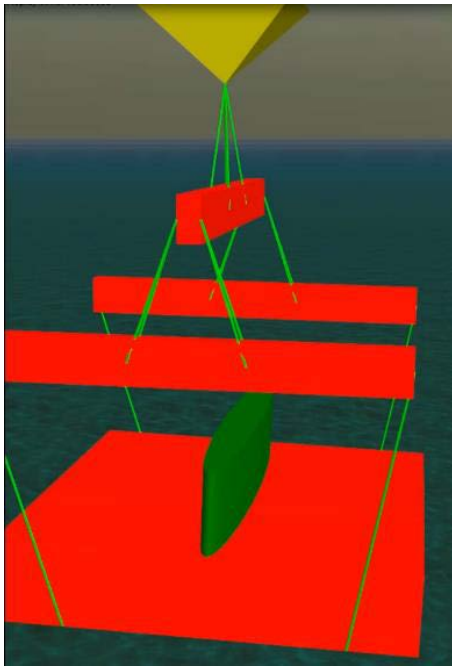
LIFTING ARRANGEMENT – LIFTING POINTS BELOW COG



4. Elaboration of lifting criteria for complex lifts of a heavy lift vessel

- Assessment and comparison of existing calculation methods (Kaps, Nikitin)
- Calculation of lift stability using Orcaflex
- Determination of impact
  - wind
  - waves (vessel motions)
  - crane movements
  - single hook vs. tandem lift
- Development of safe and economical criteria for lift stability





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