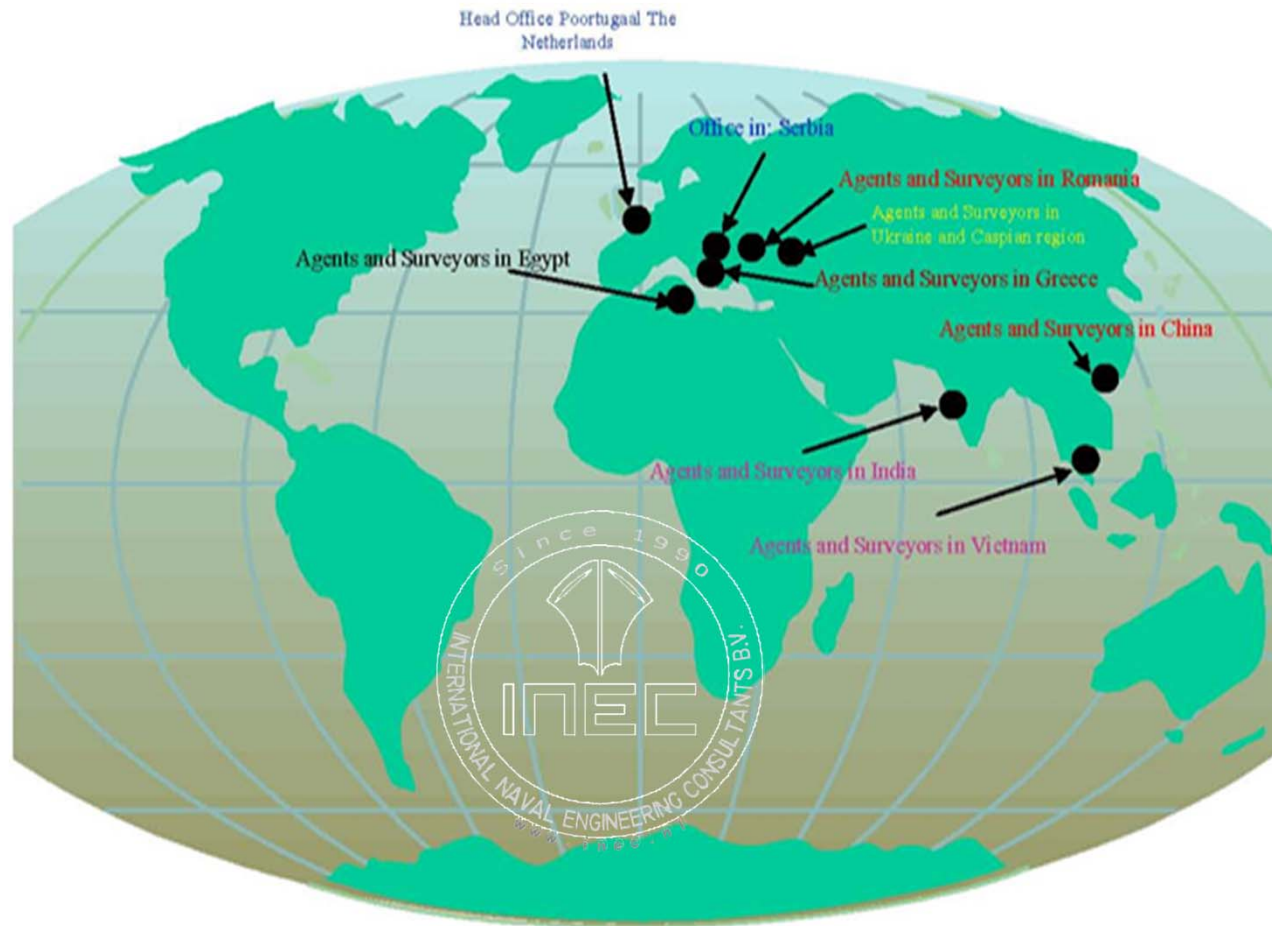


# Friendship Sayang Group

## APPLICATION of FEM's in SHIP's DESIGN



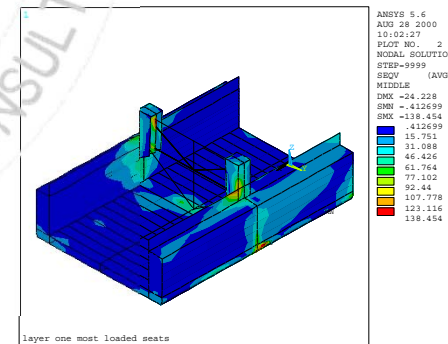
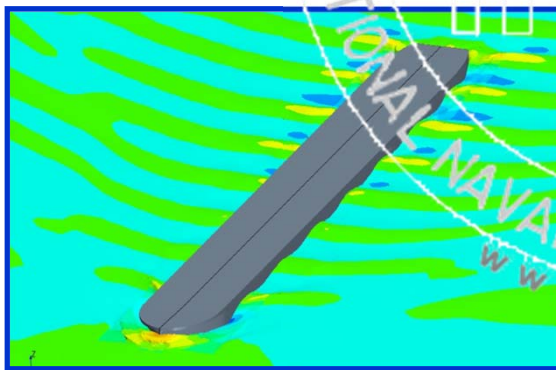
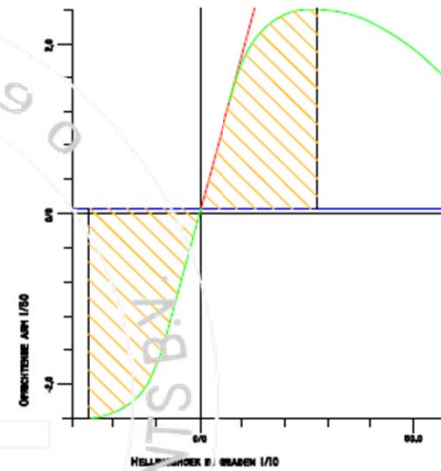
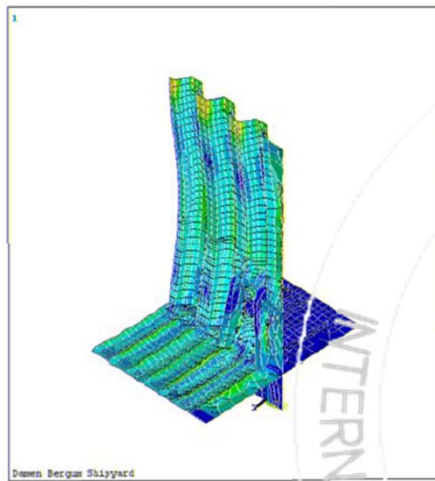
# Company profile

- Independent service to partners in all segments of ships design and ship building.
- **INEC B.V.** and **Friendship Marlin B.V.** operating under Friendship Sayang Group
- **Designing** of all types of sea-going and inland ships
- Giving **assistance** to clients during all stages of shipbuilding
- **Operating** world wide
- More than **75%** of designed ships are built or supervised by us
- Realised more than **1500** different projects



# Full Scope of Engineering

- Full design including all types of **hydrostatic** and **hydrodynamic** calculations
- Longitudinal and local strength **calculations**
- **FEM and CFD** analyses



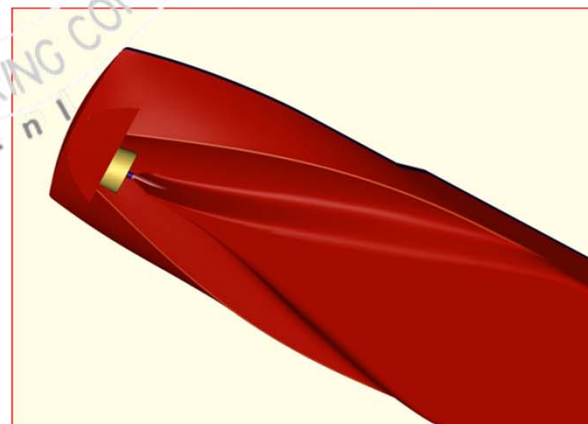
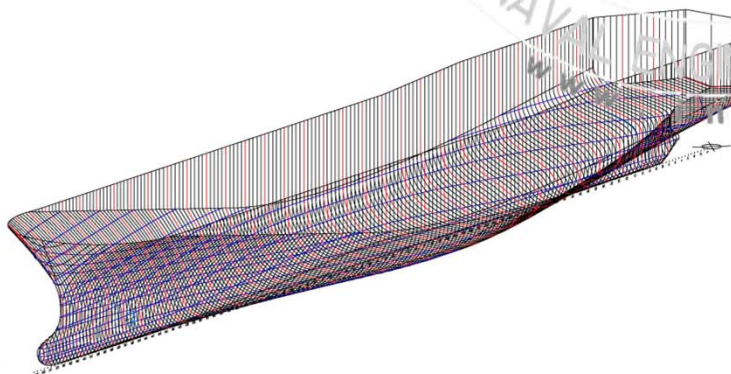
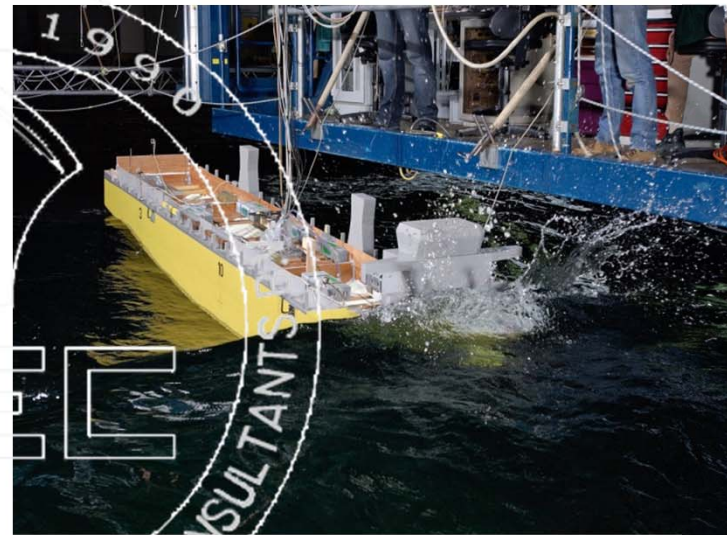
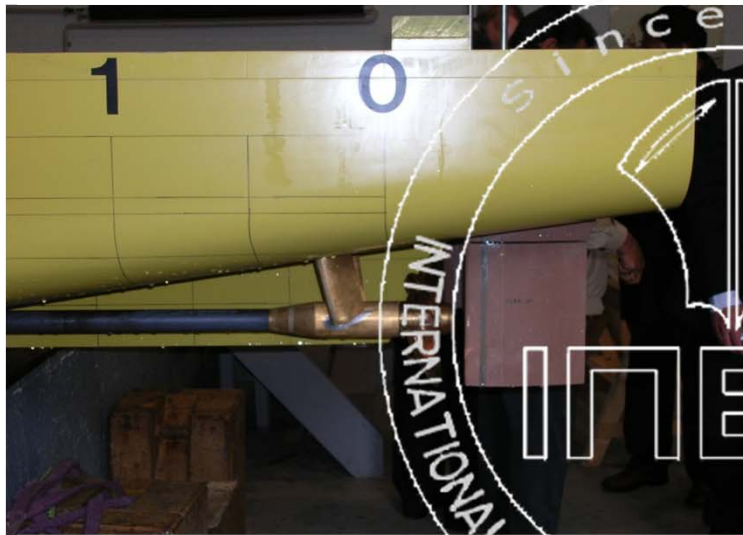


# Propulsion, form's & Model tests

Close cooperation with model test facilities in Europe and India.

Development of forms for optimal speed / consumption ratio.

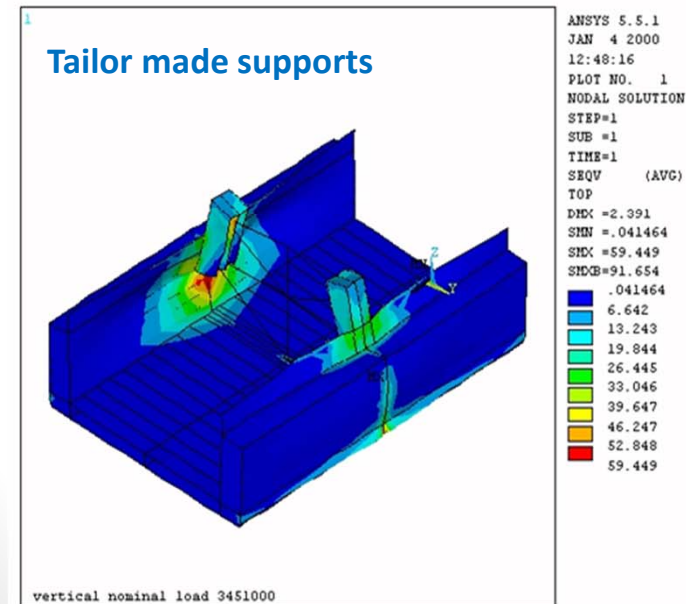
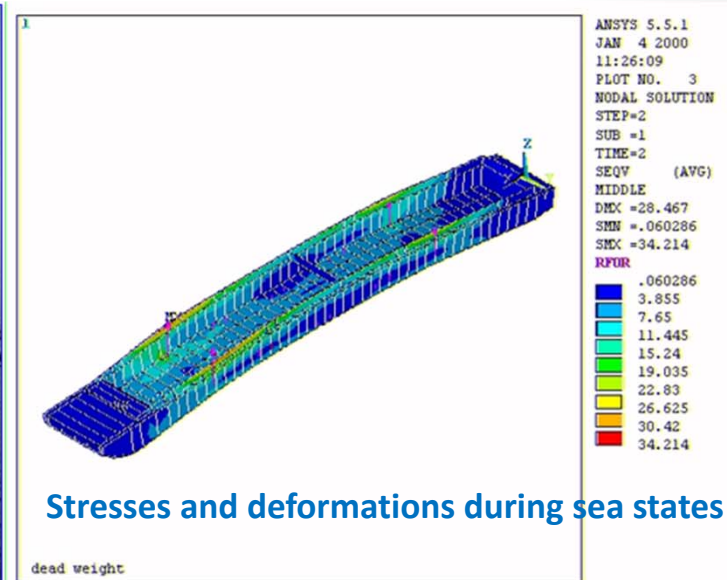
Experience with Severe Sailing Conditions.





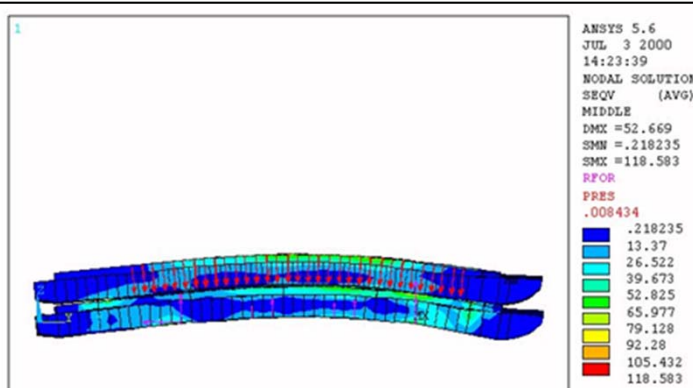
# OFFSHORE TRANSPORTS

## Complete design including FEM's



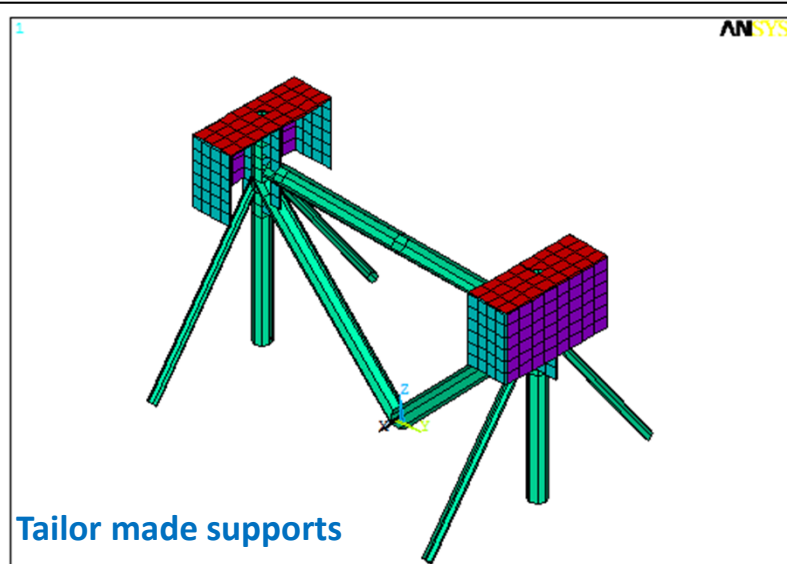
# OFFSHORE TRANSPORTS

## Complete design including FEM's



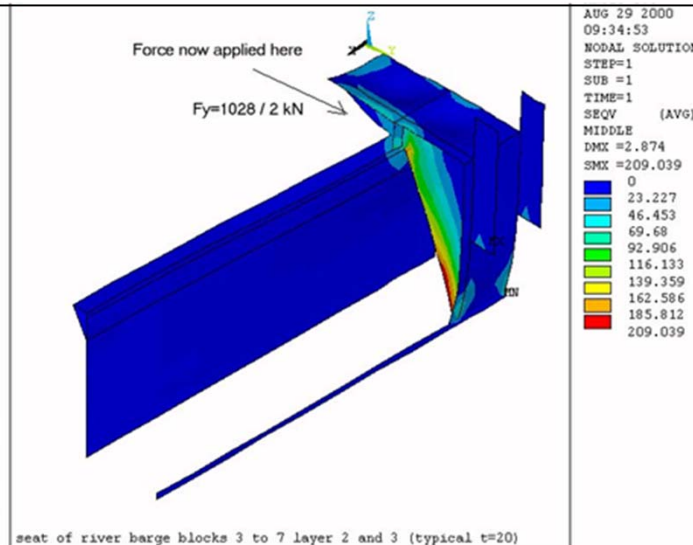
Stresses and deformations during sea states

all loads combined

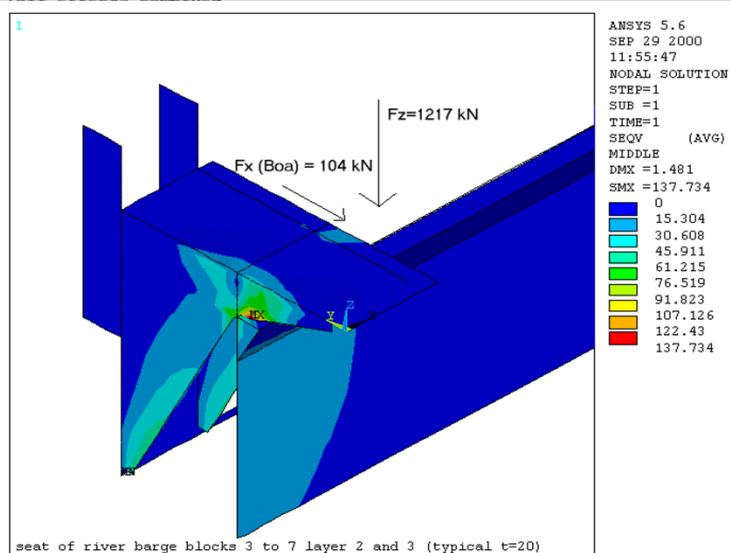


Tailormade supports

all effects combined



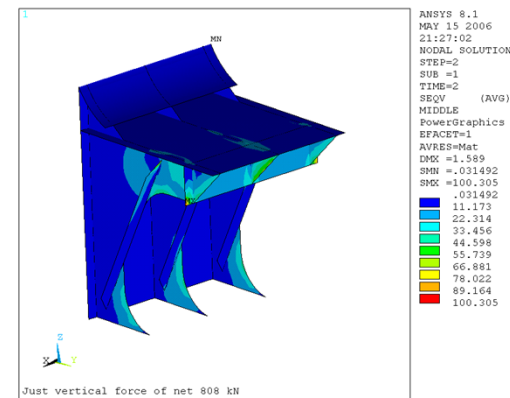
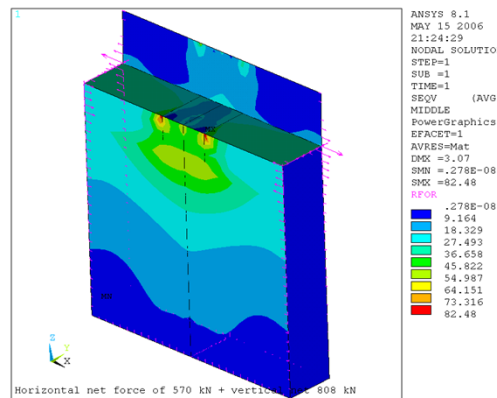
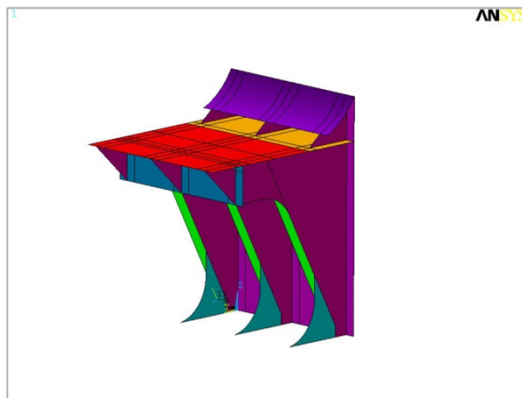
seat of river barge blocks 3 to 7 layer 2 and 3 (typical  $t=20$ )



seat of river barge blocks 3 to 7 layer 2 and 3 (typical  $t=20$ )

# OFFSHORE TRANSPORTS

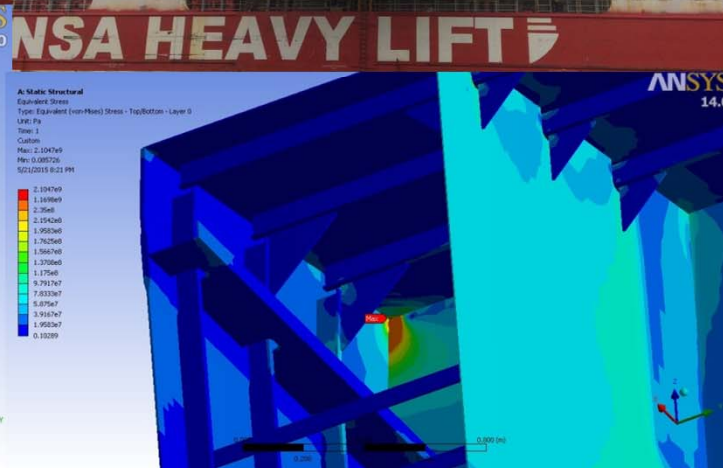
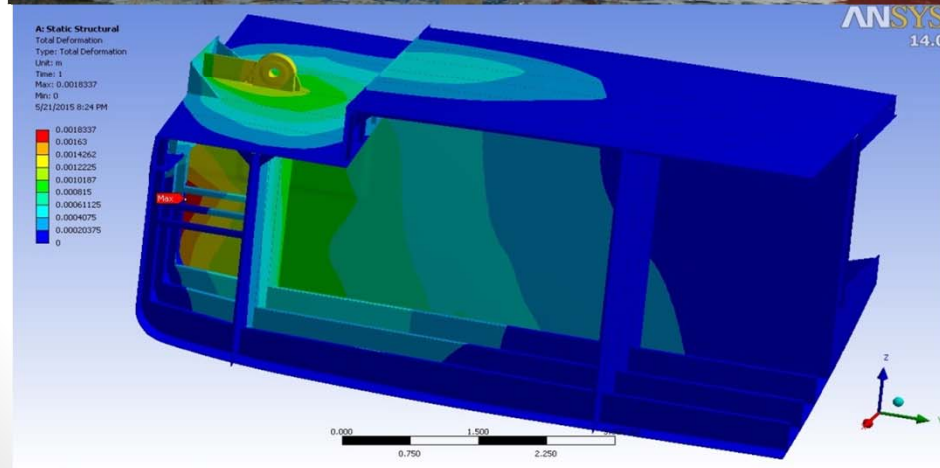
## Complete design including FEM's





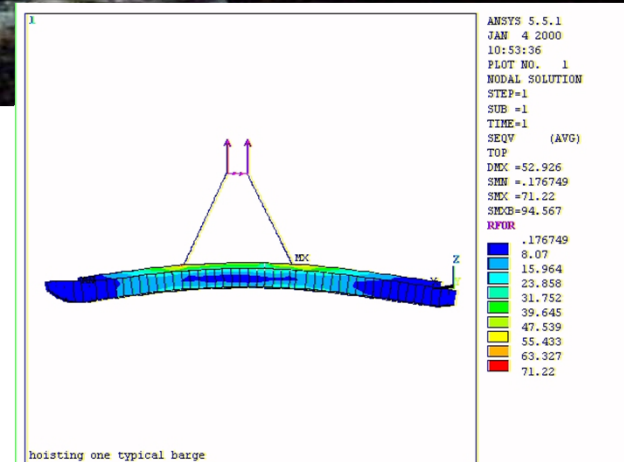
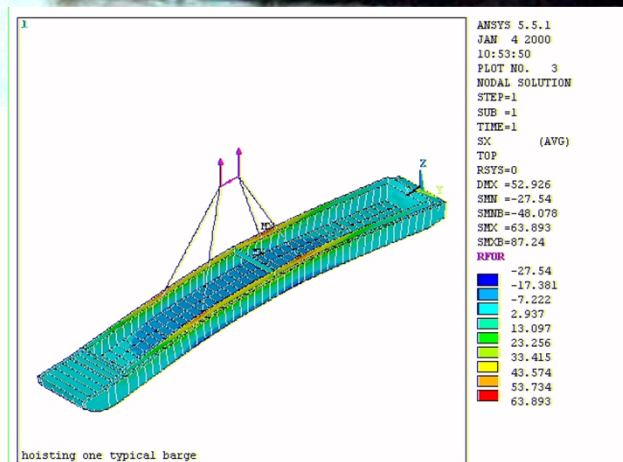
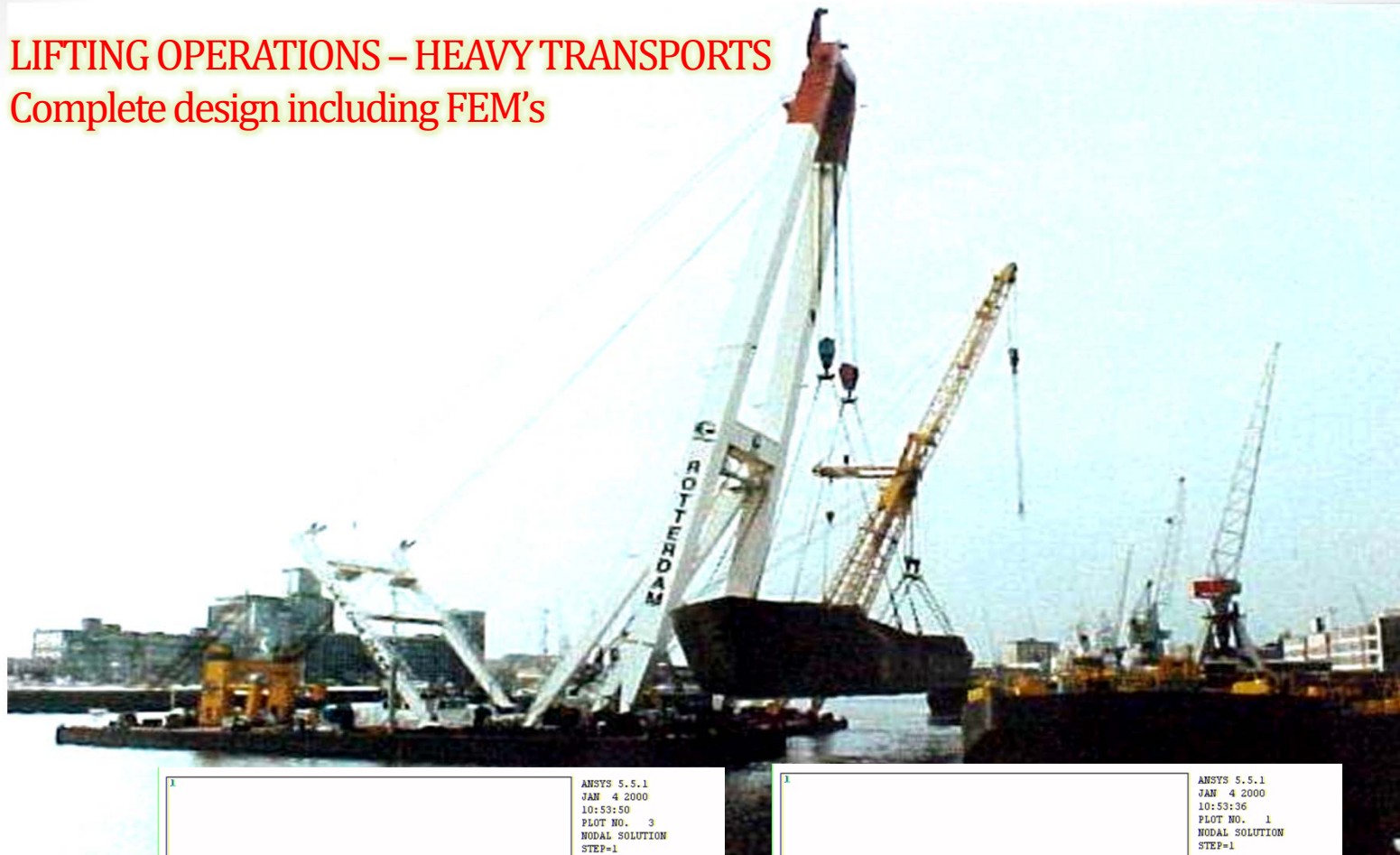
# LIFTING OPERATIONS – HEAVY TRANSPORTS

## Complete design including FEM's



# LIFTING OPERATIONS – HEAVY TRANSPORTS

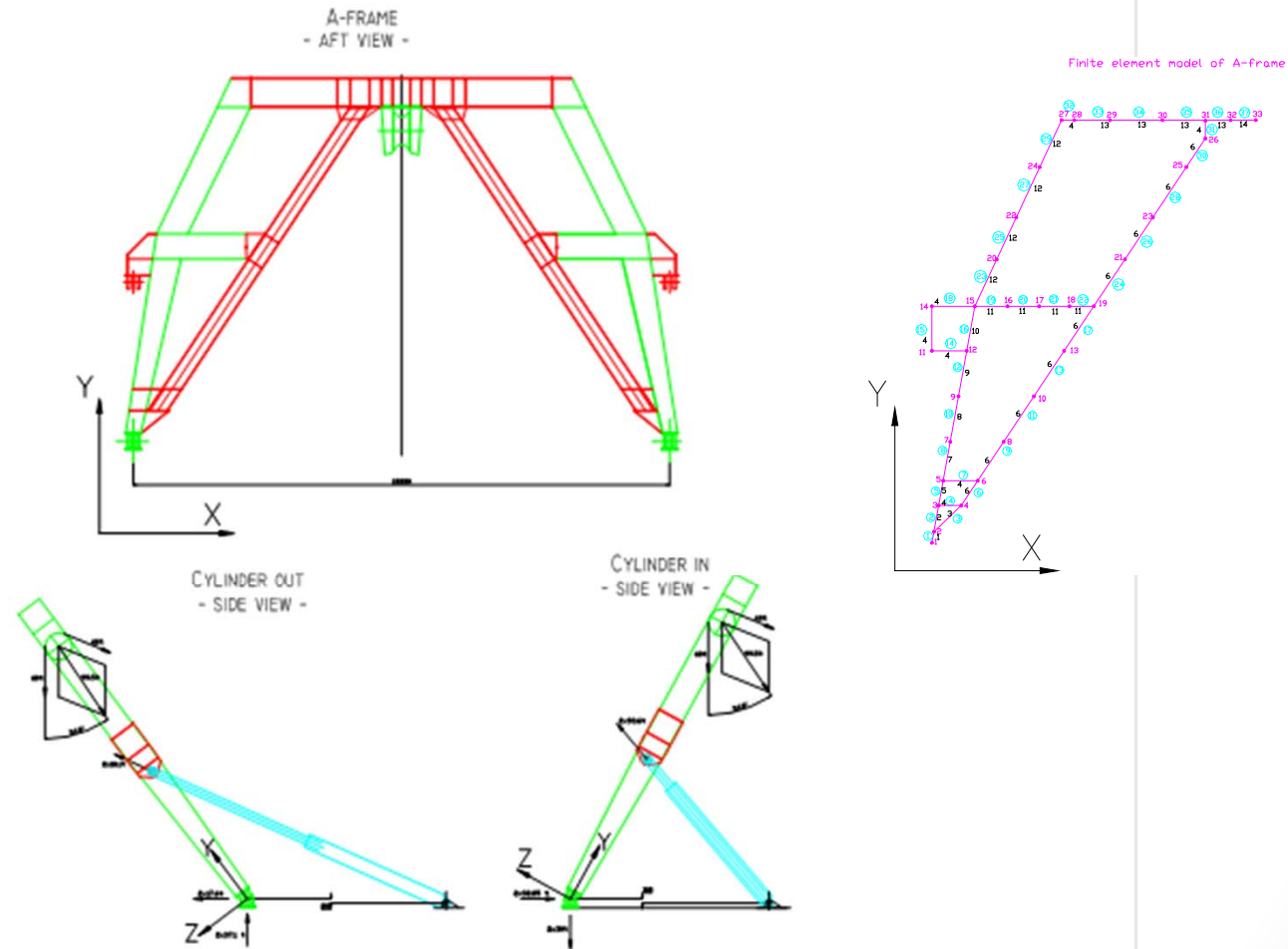
## Complete design including FEM's



# OFFSHORE PROJECTS

## Complete design including FEM's

Tailor made A-Frame for Off-Shore Support Vessel – Seaspan – Royal Schelde Vlissingen

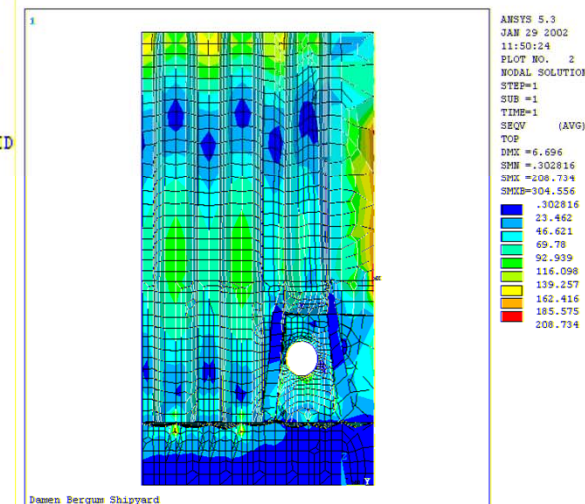
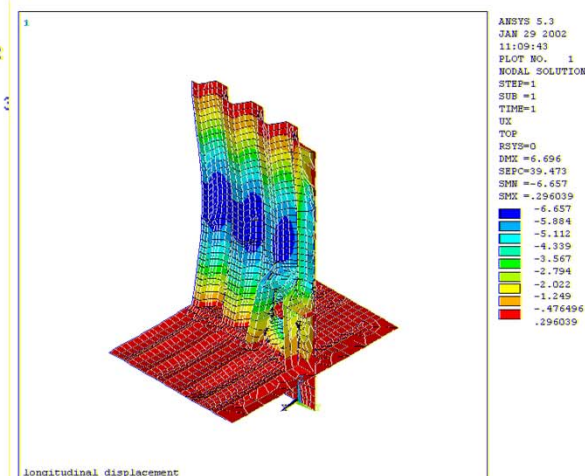
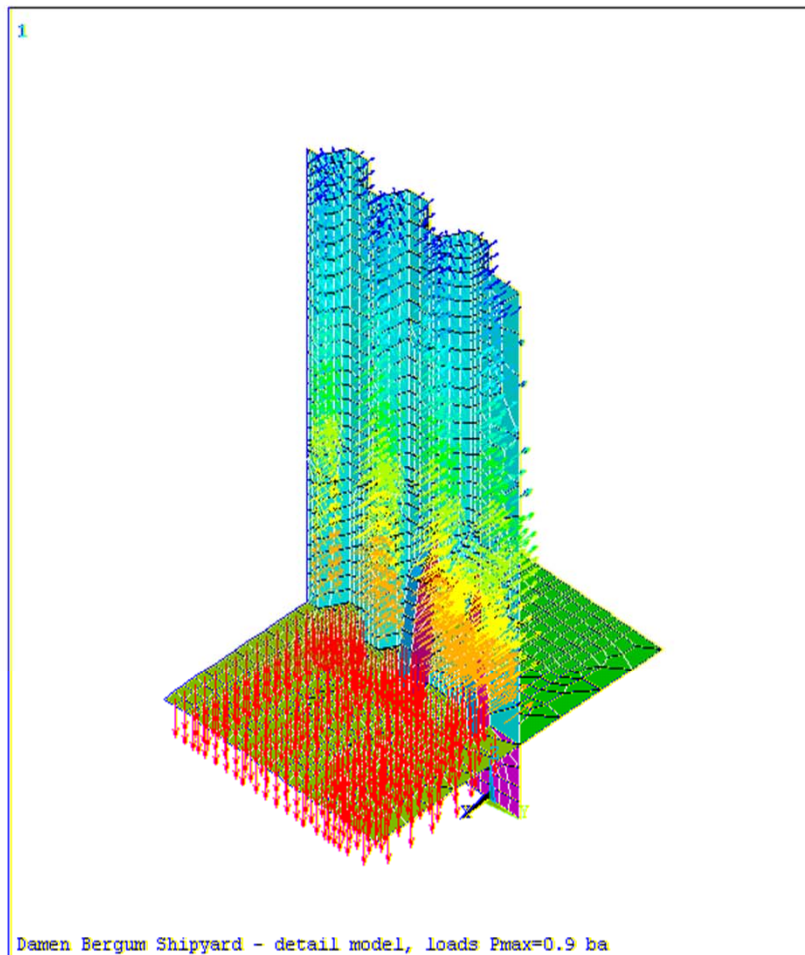




# SPECIAL DESIGNES

## Pipe Penetration Trough Corrugated Bulkhead

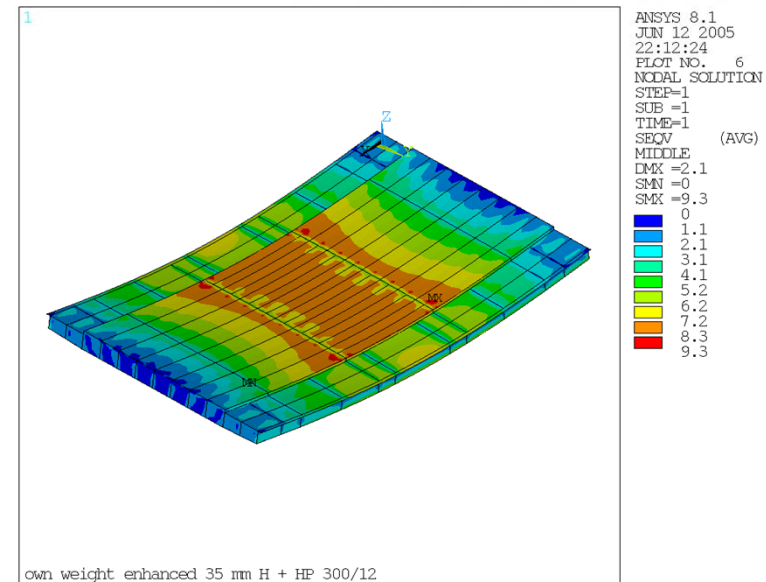
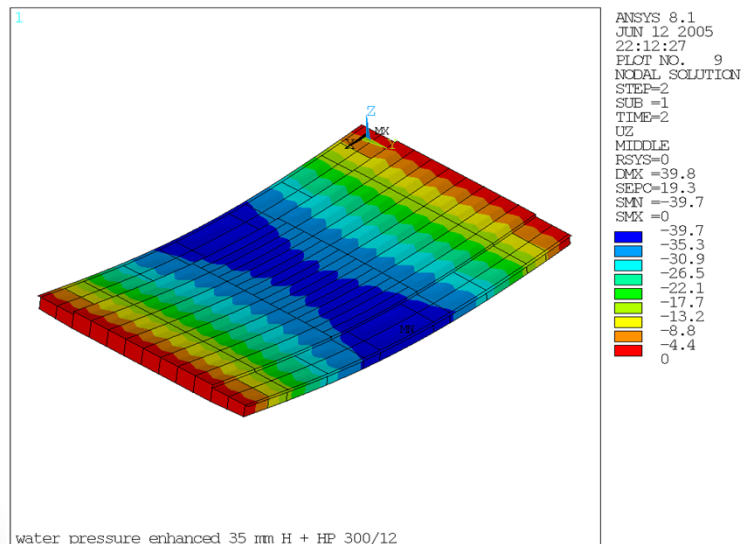
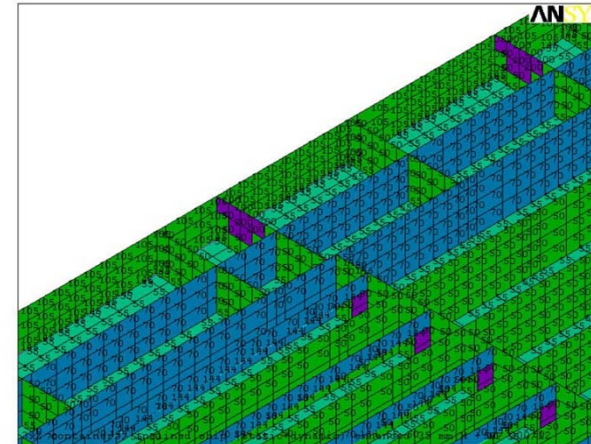
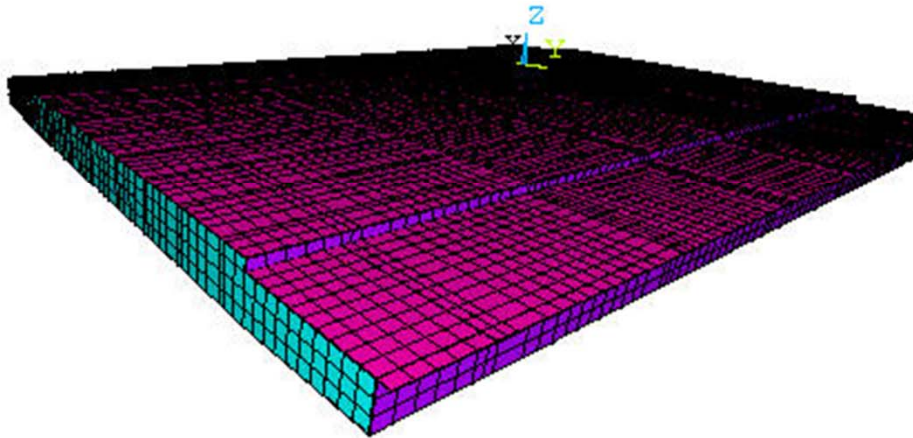
Concept of ring pipeline, penetrating multiple bulkheads – first time ever approved by LR



## SPECIAL DESIGNES

### Design of Pontoon Hatch Covers – 3200ton Sea Going Cargo Ship

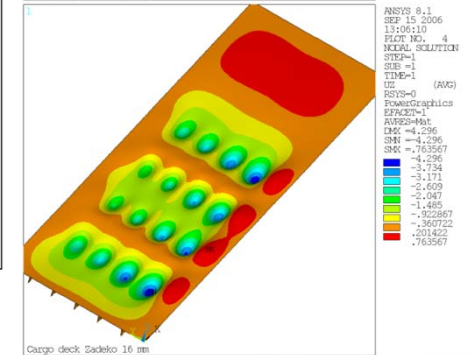
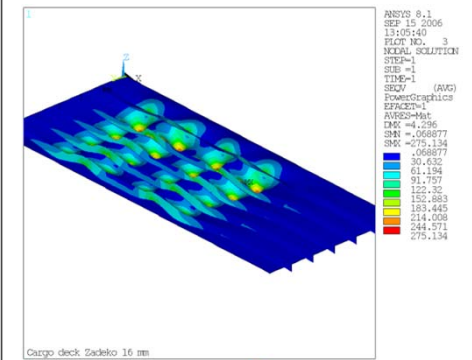
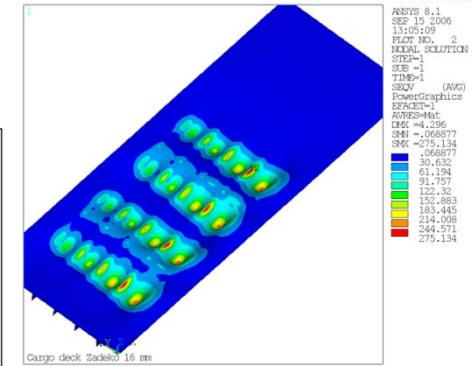
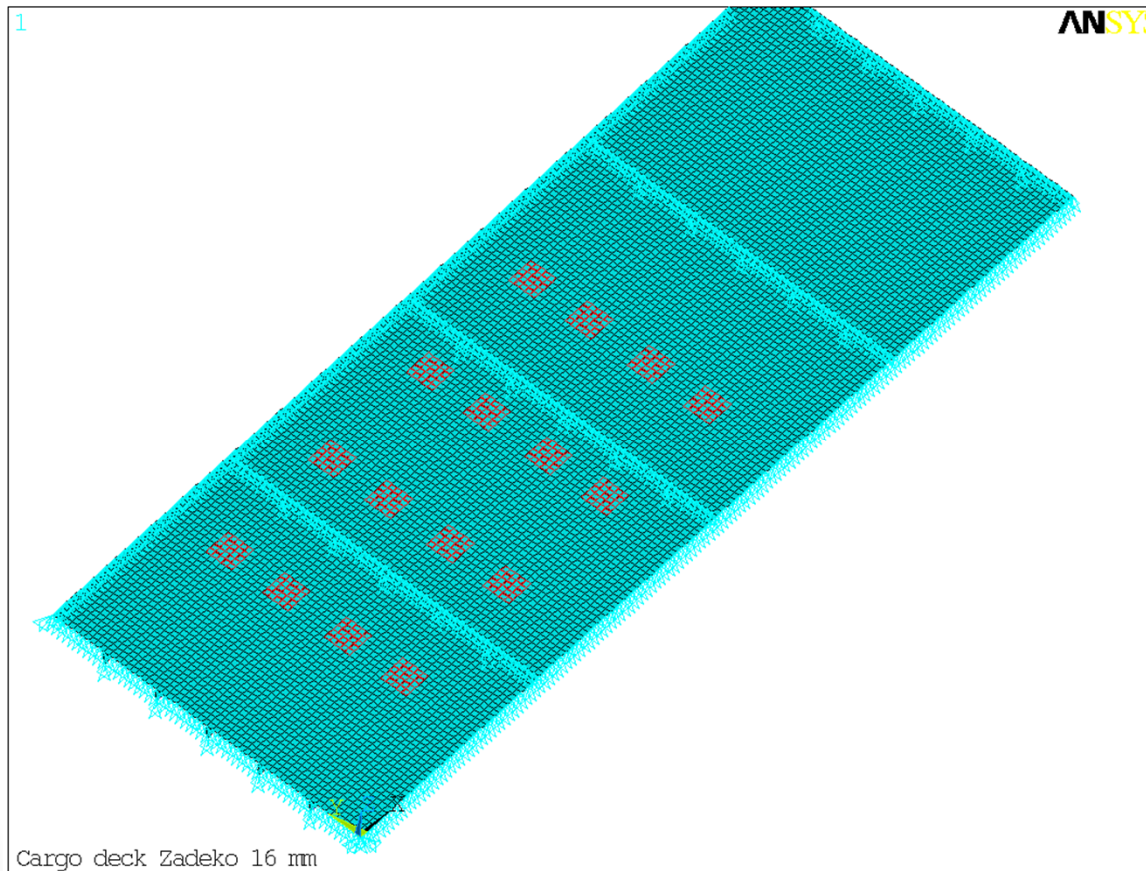
Design, all calculations, building supervision



# SPECIAL DESIGNES

## Optimization of RoRo Decks for Heavy Transports

Design, all calculations, approval management





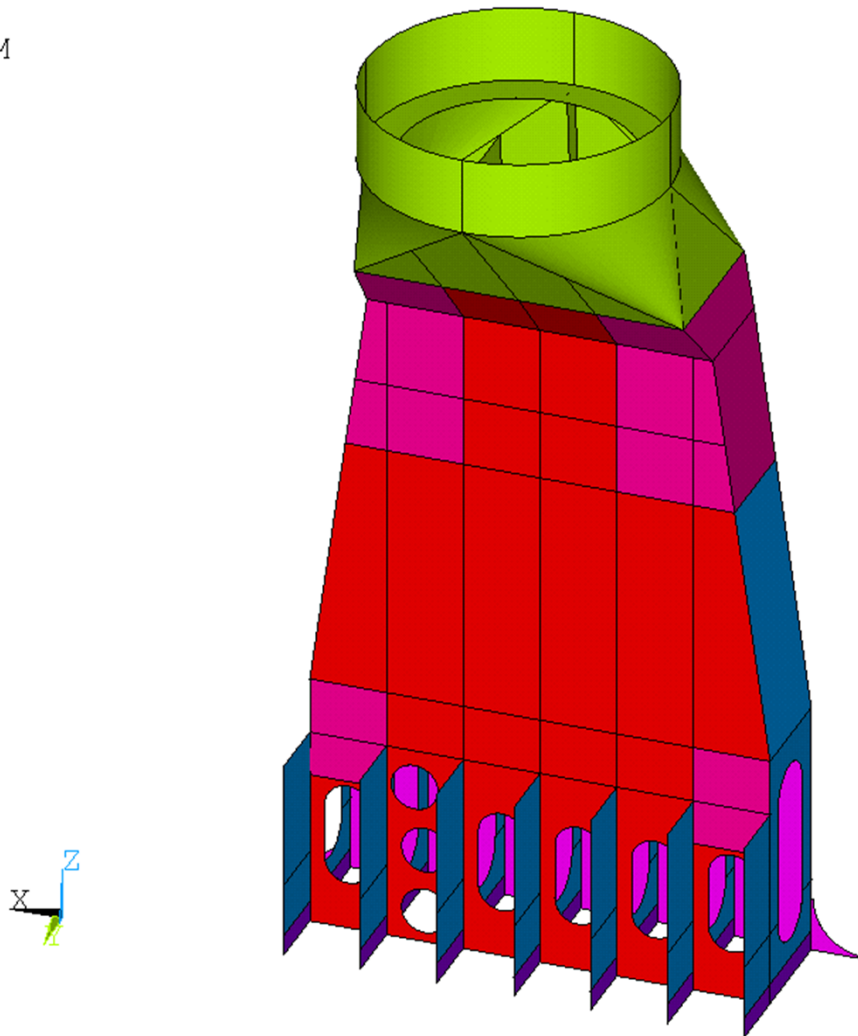
# SPECIAL DESIGNES

## Design and Optimization Ships Crane Pedestals

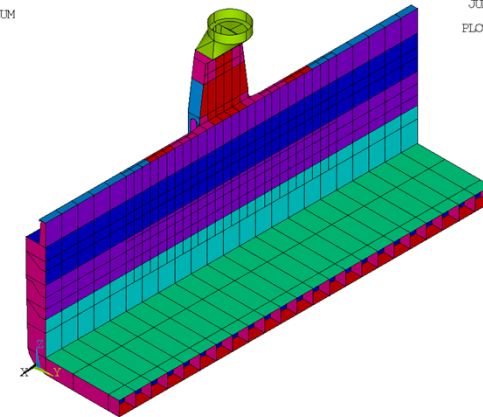
Design, all calculations, building and turn key delivery of 6 ships

1

AREAS  
REAL NUM

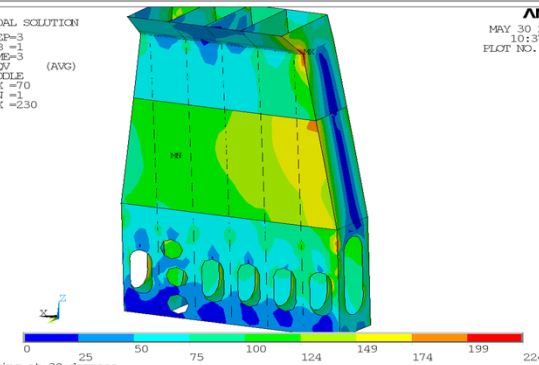


AREAS  
REAL NUM



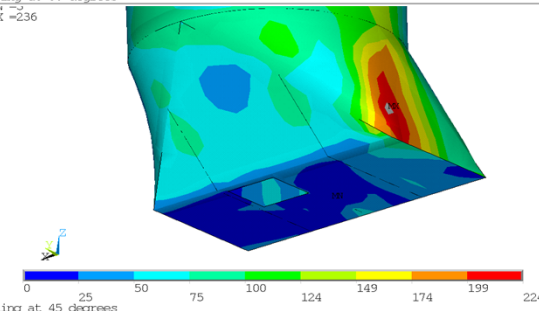
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JUN 13 2007  
16:18:25  
PLOT NO. 1

NODAL SOLUTION  
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SUB=1  
TIME=3  
SEQV (AVG)  
MIDDLE  
EMX =70  
SMX =1  
SMN =-230



ANSYS  
MAY 30 2007  
10:37:53  
PLOT NO. 1

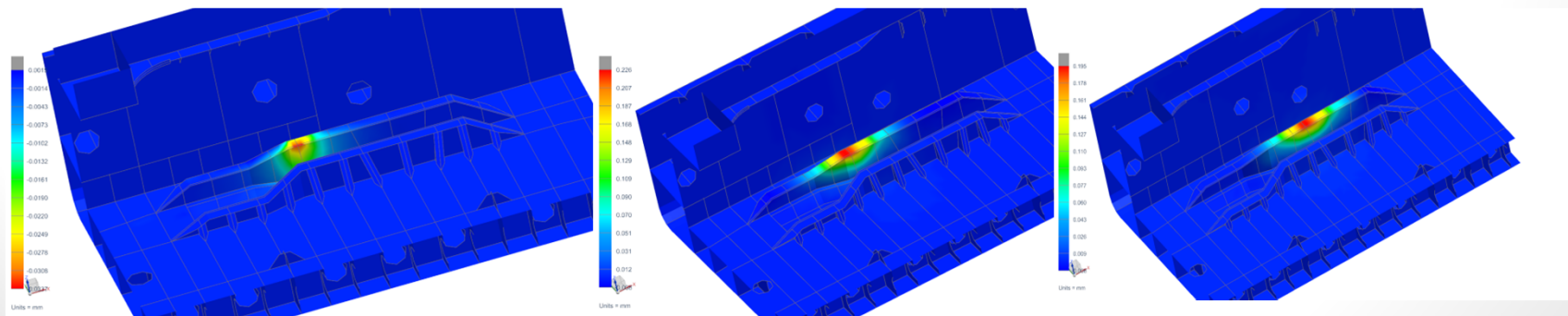
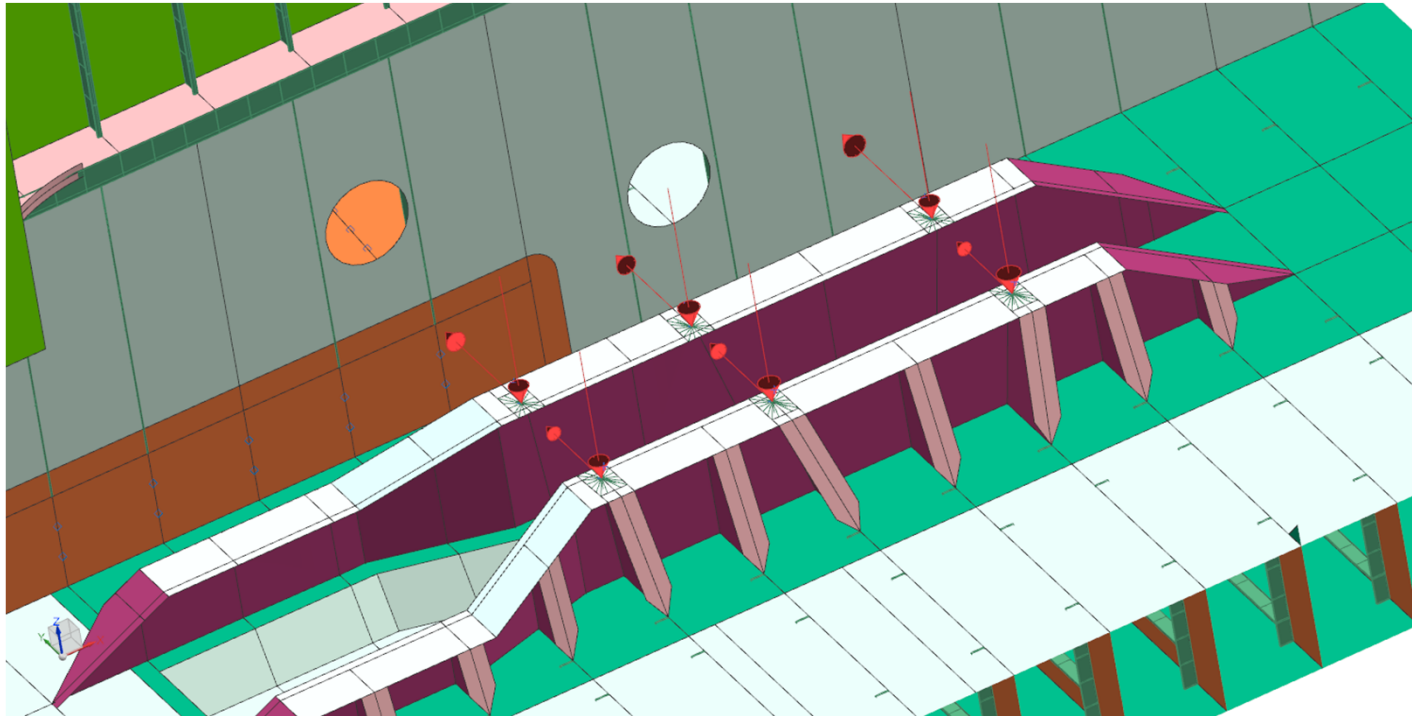
lifting at 30 degrees  
SMX =236



lifting at 45 degrees

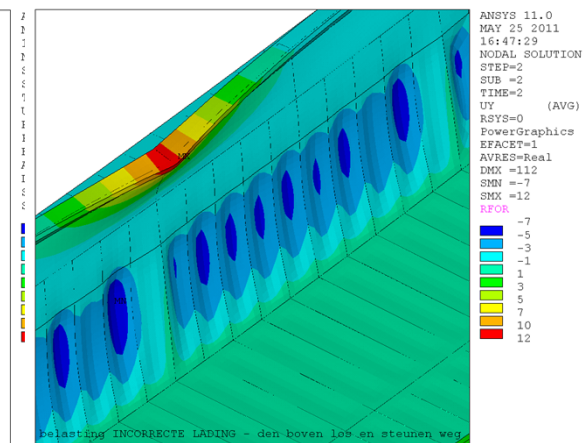
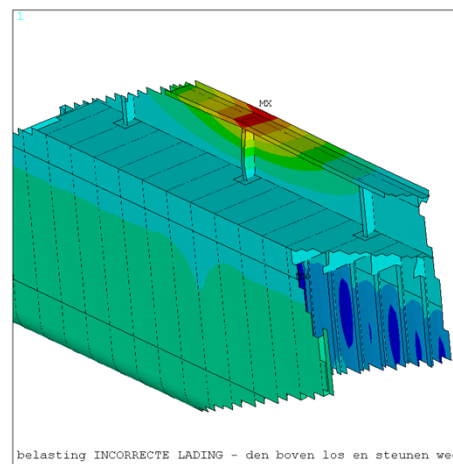
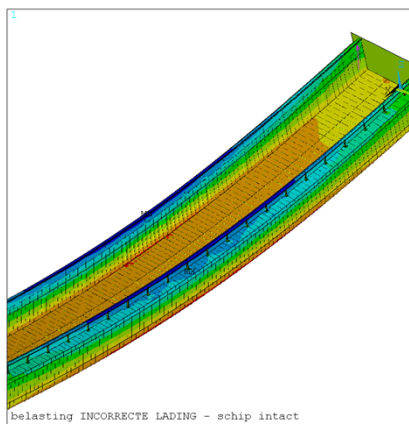
# SPECIAL DESIGNS

## Design and Optimization of Main Engine Foundations



# STUDIES, RESEARCH AND EXPERTISE

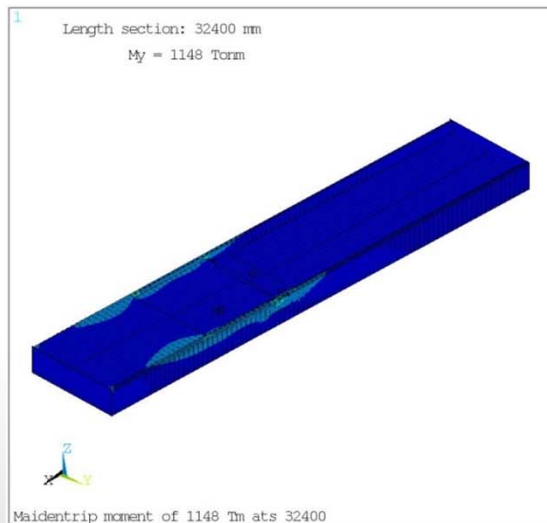
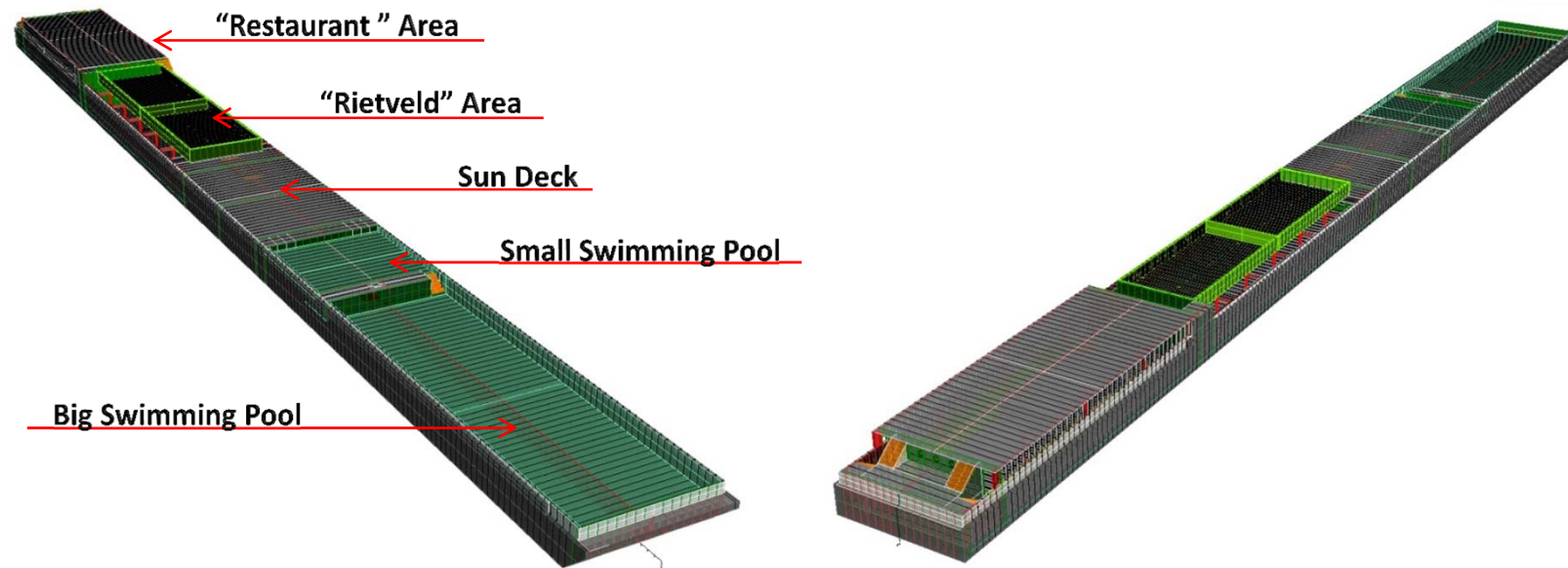
## CALAMITIES IN SHIPS CONSTRUCTIONS – FULL FORENSIC RESEARCH OF ALL POSSIBLE ASPECTS



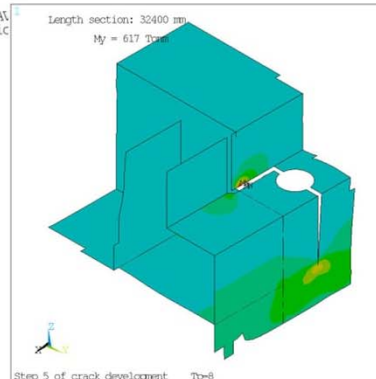


# STUDIES, RESEARCH AND EXPERTISE

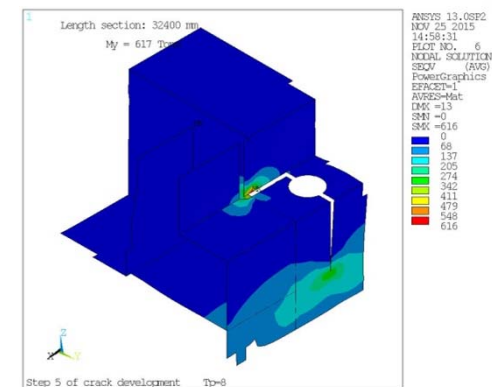
## CALAMITIES IN SHIPS CONSTRUCTIONS – FULL FORENSIC RESEARCH OF ALL POSSIBLE ASPECTS



ANSYS 13.0SP2  
NOV 20 2015  
17:20:54  
PLOT NO. 2  
NODAL SOLUTION  
STEP=9999  
SEQV (AVG)  
PowerGraphics  
EFACET=1  
AVRES=Mat  
DMK =190  
SMN =0  
SMX =570  
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63  
127  
190  
253  
317  
380  
443  
507  
570



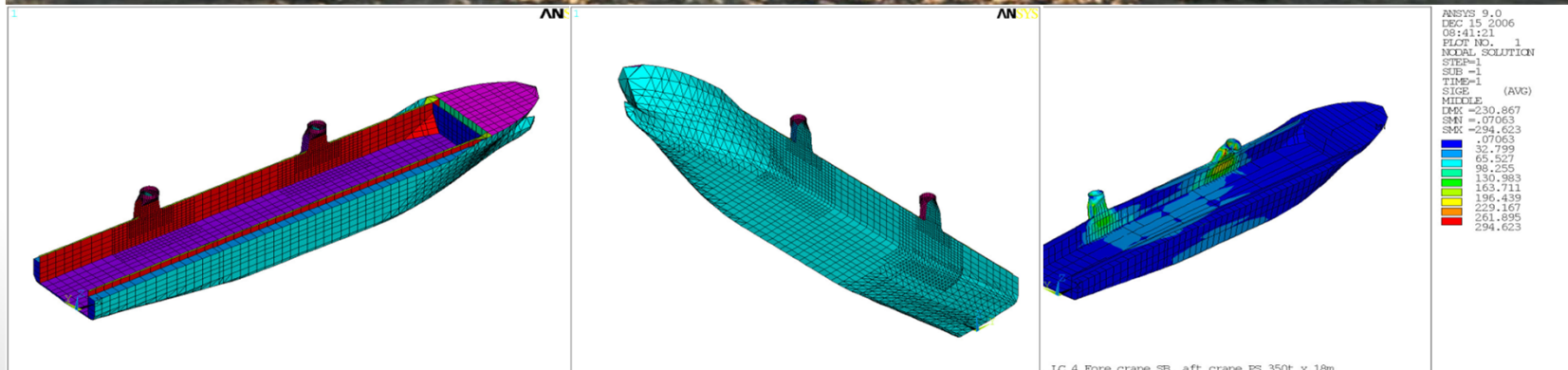
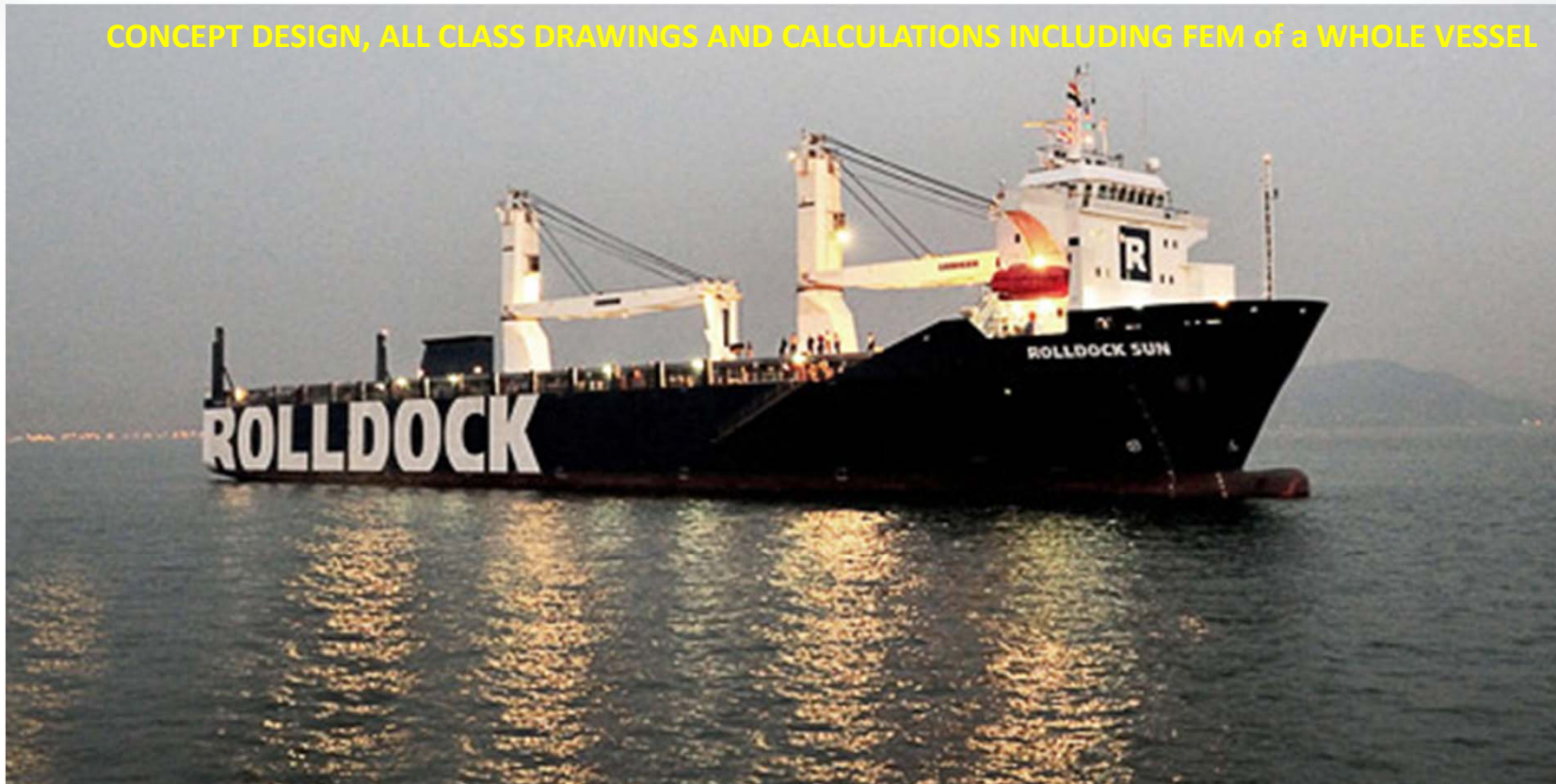
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NOV 25 2015  
14:58:31  
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NODAL SOLUTION  
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PowerGraphics  
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AVRES=Mat  
DMK =13  
SMN =-227  
SMX =567  
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-46  
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315  
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496  
567



ANSYS 13.0SP2  
NOV 25 2015  
14:58:31  
PLOT NO. 6  
NODAL SOLUTION  
SEQV (AVG)  
PowerGraphics  
EFACET=1  
AVRES=Mat  
DMK =13  
SMN =0  
SMX =616  
0  
66  
137  
205  
274  
342  
411  
479  
548  
616

# SHIP' DESIGN AND GLOBAL CONSTRUCTION OPTIMIZATION

CONCEPT DESIGN, ALL CLASS DRAWINGS AND CALCULATIONS INCLUDING FEM of a WHOLE VESSEL

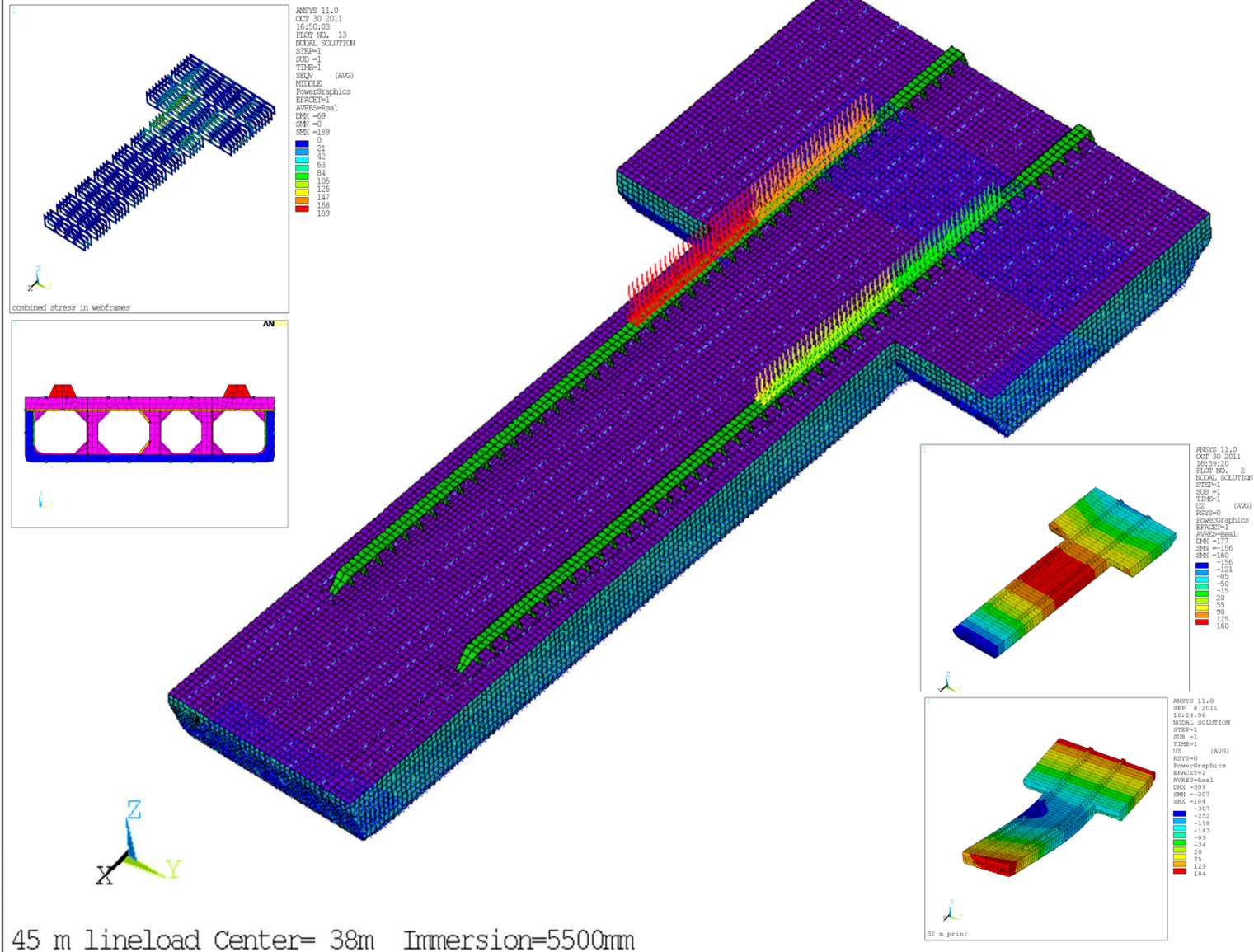




# SHIP' DESIGN AND GLOBAL CONSTRUCTION OPTIMIZATION

## 1 CONCEPT DESIGN, ALL CLASS DRAWINGS AND CALCULATIONS INCLUDING FEM of a WHOLE OFF SHORE PONTON INCLUDING LOAD ON-OFF OPERATIONS

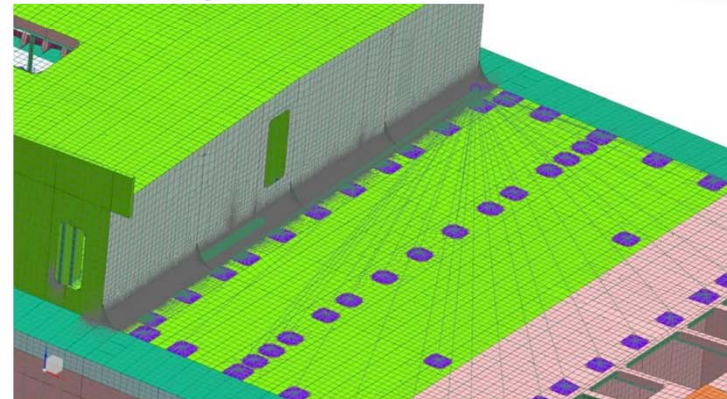
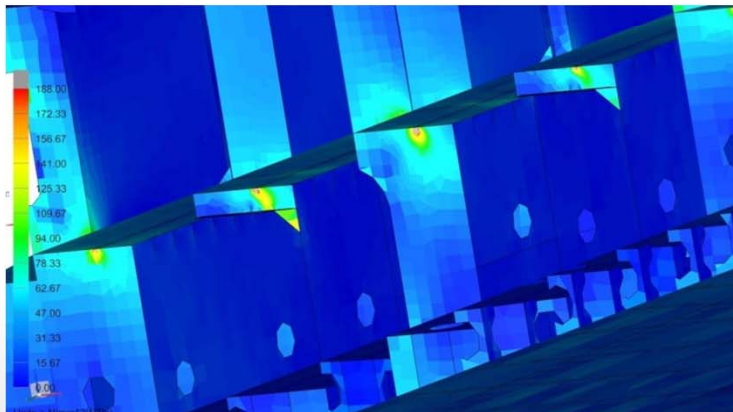
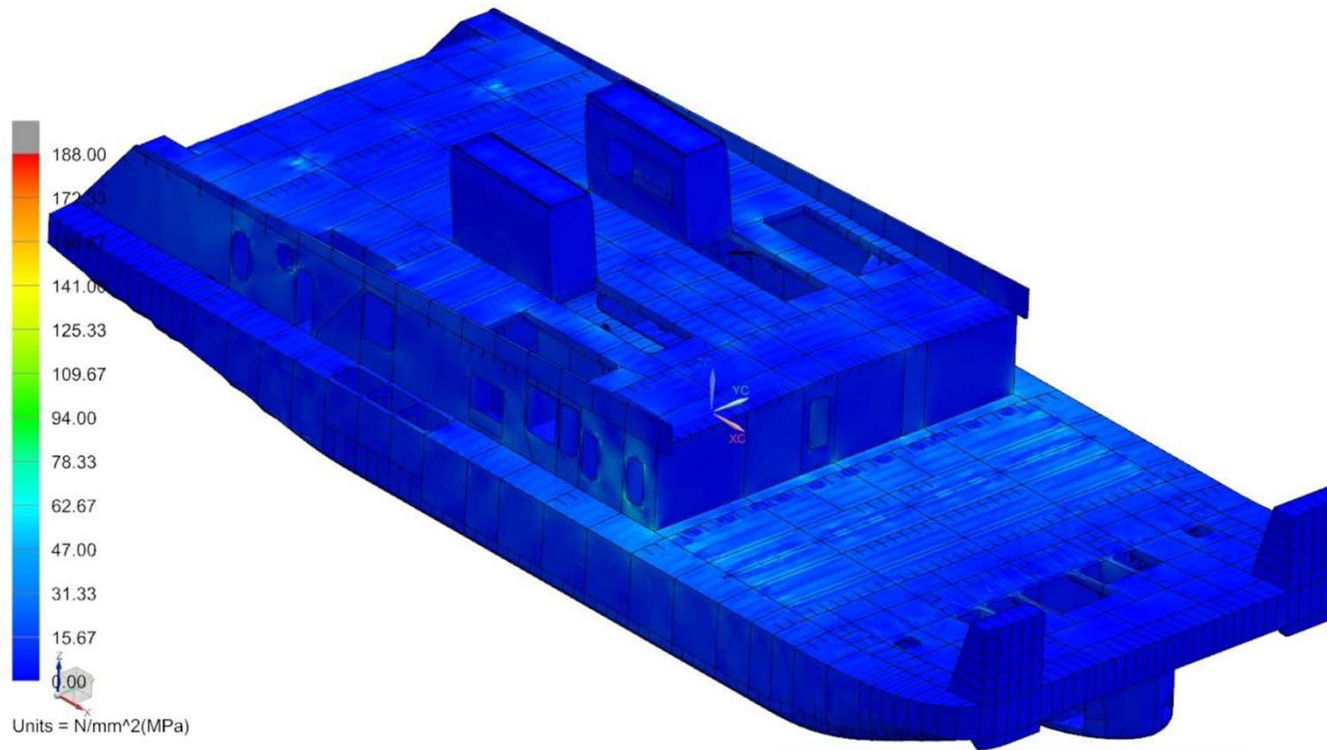
ANSYS



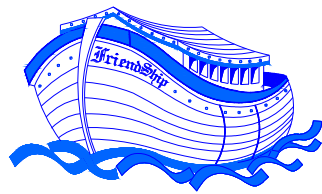


# SHIP' DESIGN AND GLOBAL CONSTRUCTION OPTIMIZATION

CONCEPT DESIGN, ALL CLASS DRAWINGS AND CALCULATIONS INCLUDING MANAGEMENT of  
FEM's of Inland Pusher with 4 Engines



FOR ALL YOUR SHIP DESIGN AND BUILDING PROJECT  
FOR ALL CONSULTING AND EXPERTISE  
FOR TURN KEY DELIVERY OF SHIPS  
FOR ONSITE ASSISTANCE AND PROJECT MANAGEMENT



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e-mail: [nesha@planet.nl](mailto:nesha@planet.nl)