



IMPROVE

***DESIGN OF IMPROVED AND COMPETITIVE
PRODUCTS USING AN INTEGRATED DECISION
SUPPORT SYSTEM
FOR SHIP PRODUCTION AND OPERATION***

2 October 2006



IMPROVE

Stocznia Szczecińska NOWA



Title

- SIXTH FRAMEWORK PROGRAMME
- PRIORITY 1.6.2:
- SUSTAINABLE SURFACE TRANSPORT

IMPROVE :

- ➔ RDMM = Rational decision making methods
- ➔ DSP = Decision Support Problem



CHEMICAL TANKER

of

STOCZNIA SZCZECIŃSKA NOWA



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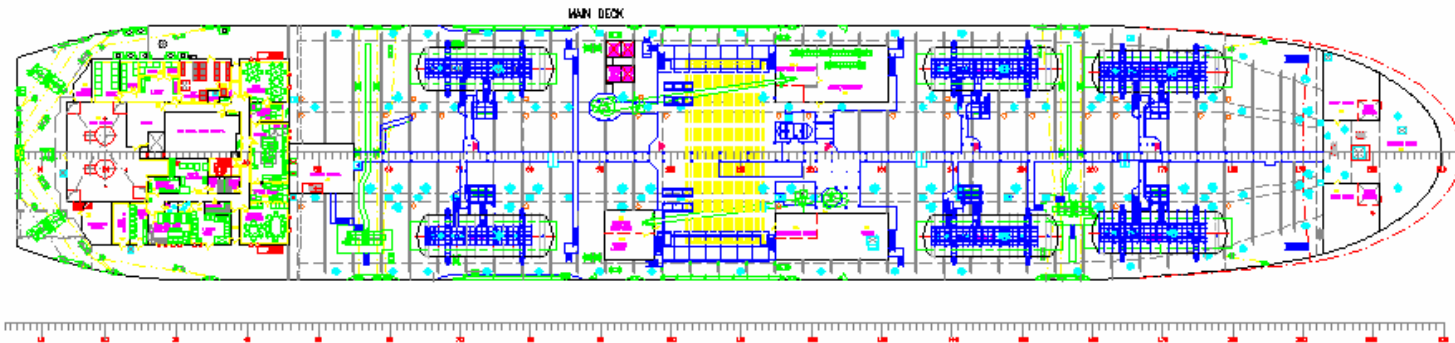
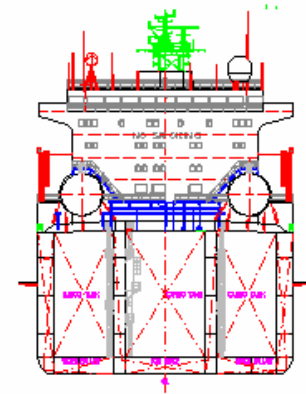
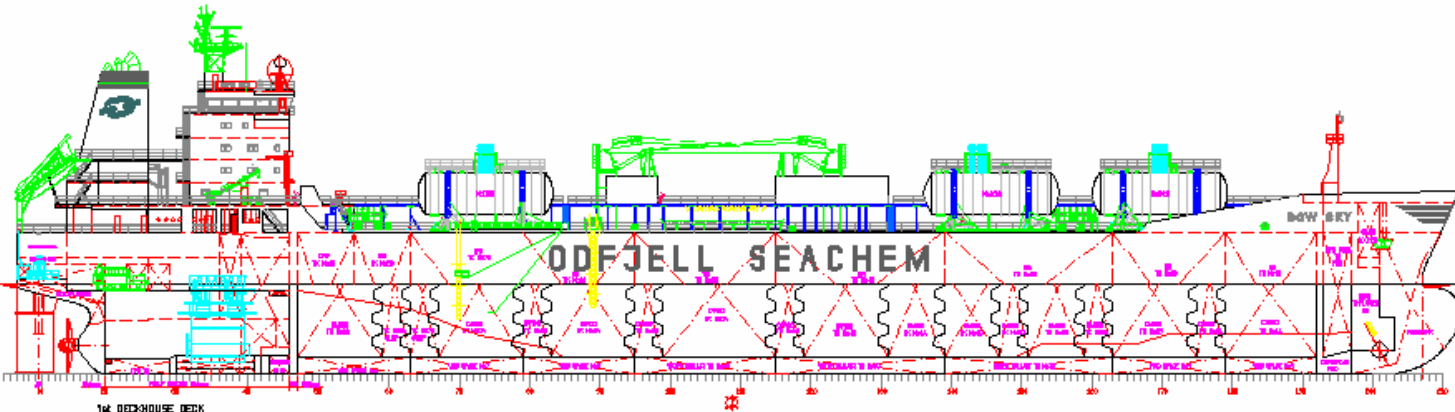


SHIP MAIN PARTICULARS

- Length O.A. 182.88 m
- Length B.P. 175.25 m
- Breadth moulded 32.20 m
- Depth to M.D. 17.95 m
- Design draught 10.80 m
- Scantling draught 11.50 m
- Deadweight 40 000 mt
- Service speed 15.3 kn



SHIP GENERAL ARRANGEMENT



MAIN DATA

LENGTH O.A.	max 182,88 m
LENGTH B.P.	175,25 m
BREADTH MOULDED	32,20 m
DEPTH	17,95 m
DRAUGHT (DECK)	10,80 m
DRAUGHT (CRUISING)	11,50 m
DEADWEIGHT (at CRUISING DRAUGHT)	36 000 mt
DEADWEIGHT (at SEAFARER DRAUGHT)	30 500 mt
CARGO TANK'S CAPACITY (at CRUISING DRAUGHT)	50 002 m ³
CARGO DECK TANK'S CAPACITY (at CRUISING DRAUGHT)	2 124 m ³
SERVICE SPEED (at CRUISING DRAUGHT)	13,5 kn
COMPLEMENT	32prs+1P1stH+6(Stoww Crew)
CLASS	DNV

ALL SIZES FOR HULLS AND IN. OF D.
 HULLS AND CRUISING DRAUGHT, SEAFARER DRAUGHT
 AND CRUISING DRAUGHT FOR STOWW CREW
 ALL SIZES FOR HULLS AND CRUISING DRAUGHT
 AND CRUISING DRAUGHT FOR STOWW CREW

FLAG : Singapore

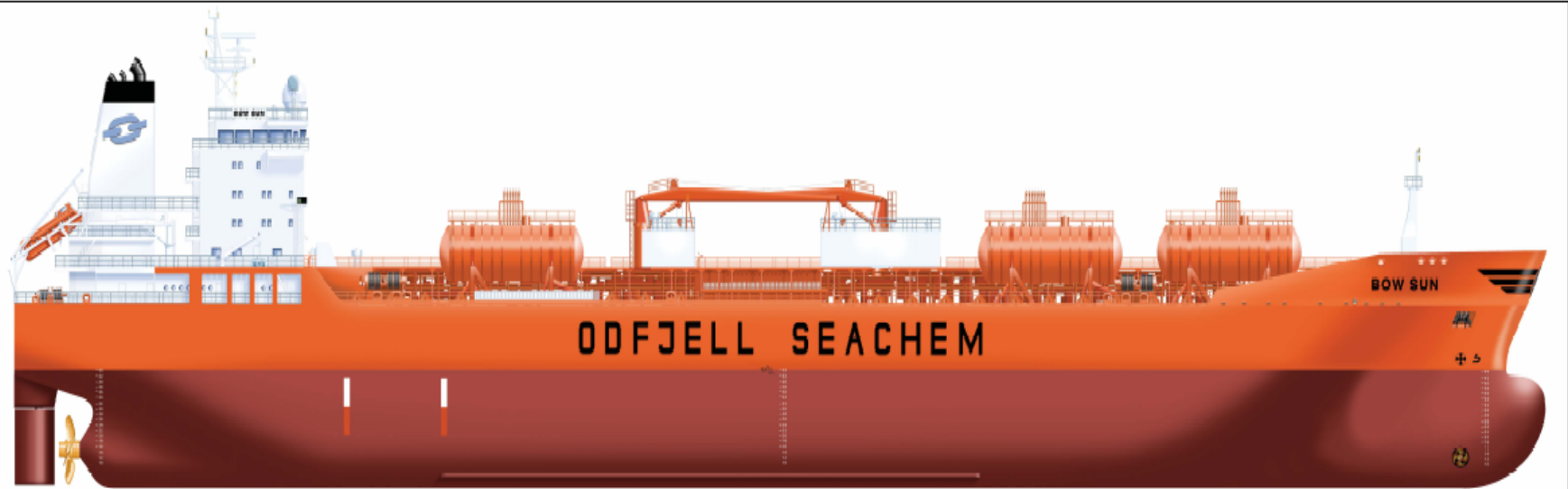


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SHIP GENERAL VIEW

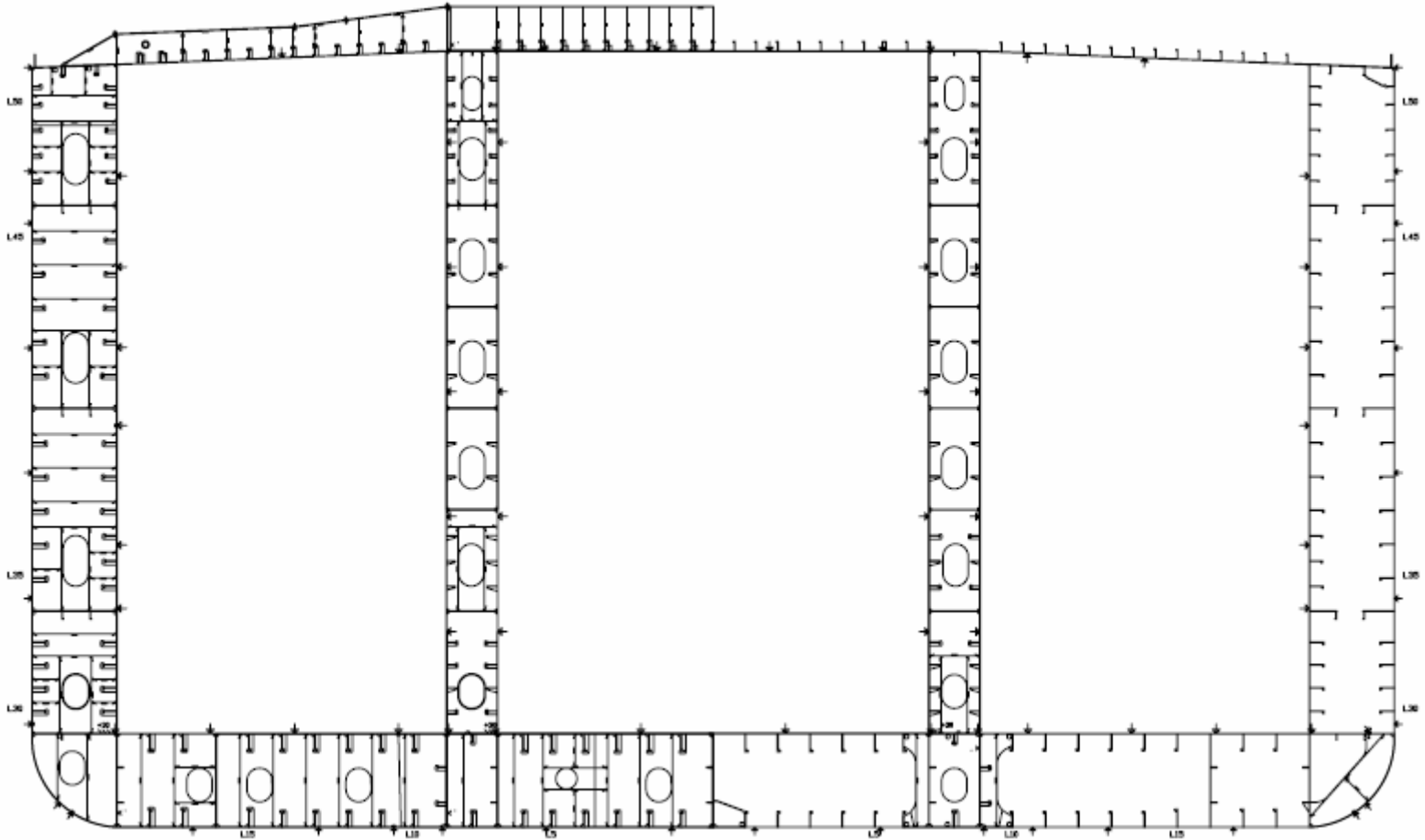


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TYPICAL MIDSHIP SECTION



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CLASS NOTIFICATION

DnV + 1A1, Tanker for Oil Products and Chemicals

ESP, E0, NAUT-OC, LCS (SID), ETC, HL

(1.85 t/m³ for center tanks,

1.25t/m³ for wing tanks

1.70t/m³ for deck tanks)

VCS 2, PLUS-2, NAUTICUS (Newbuilding), Ship type 1&2.

Center/slop tanks a2, b3, c3, v3, f2, str 0.1, ss, T4 IIA / IIB / IIC

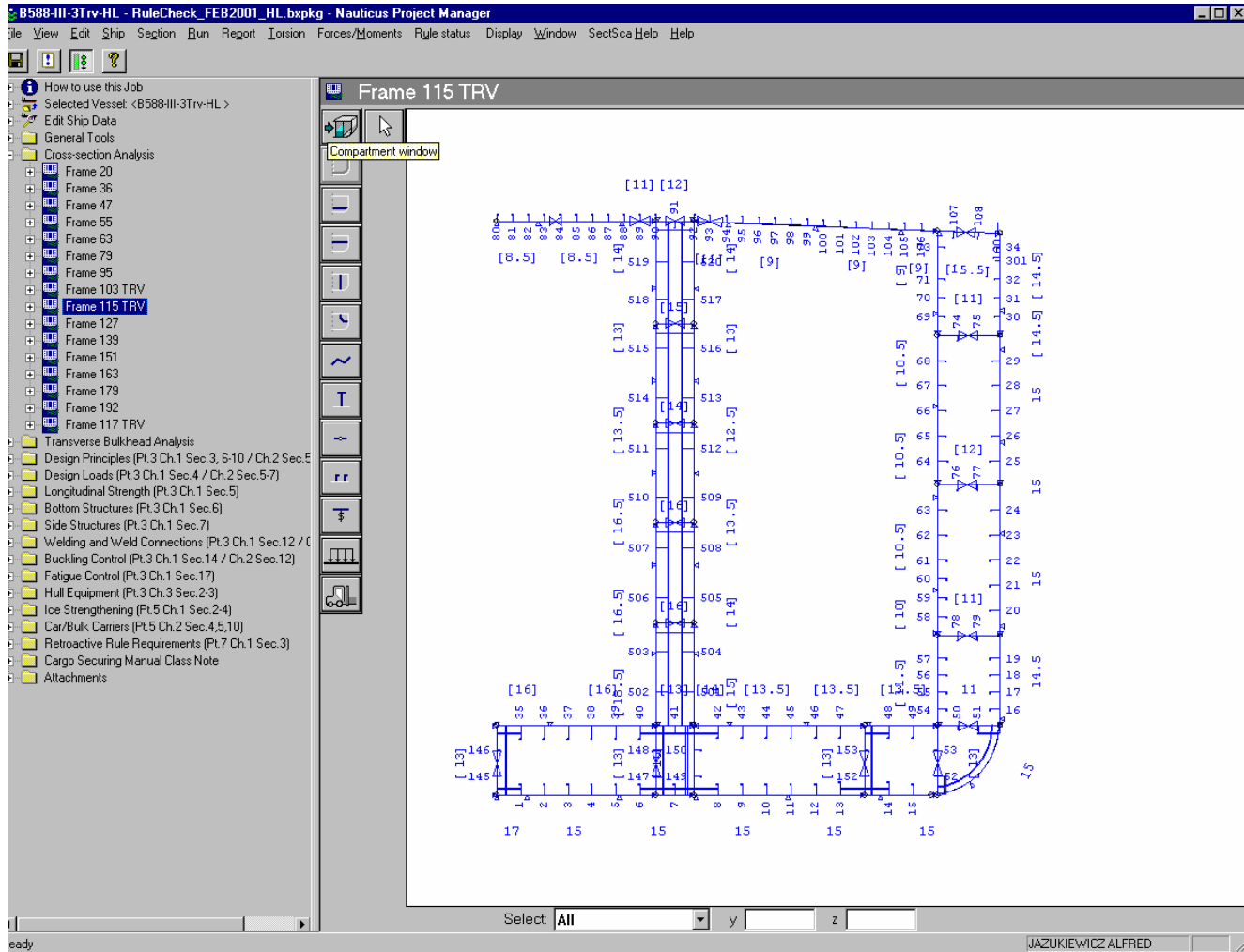
Wing tanks a2, b3, c3, v3, f2, str 0.1, ss, T4 IIA / IIB

Deck tanks a3, b3, c3, v3, f3, str 0.1, ss, T4 IIA / IIB

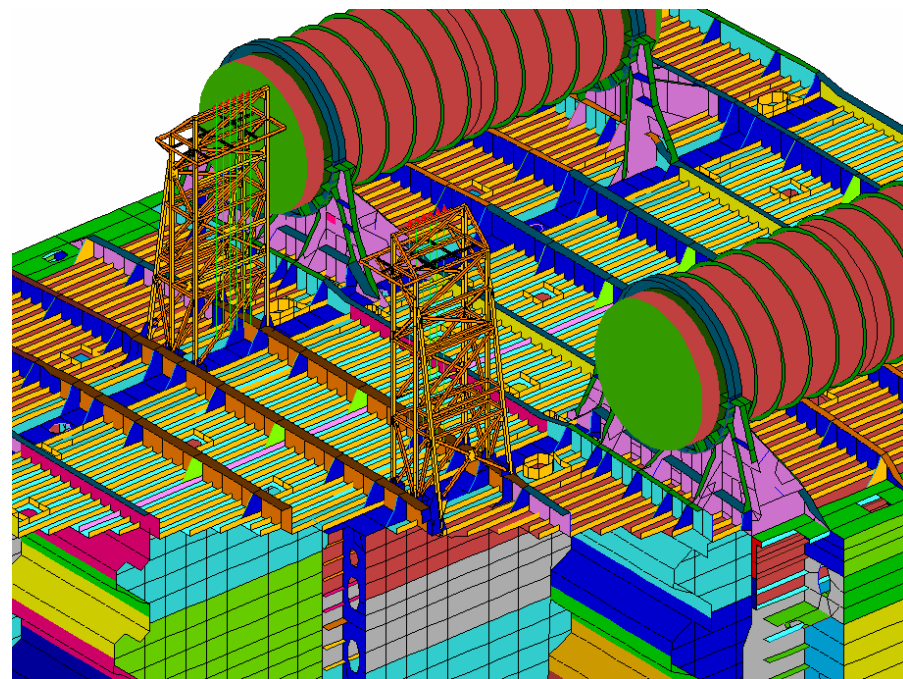
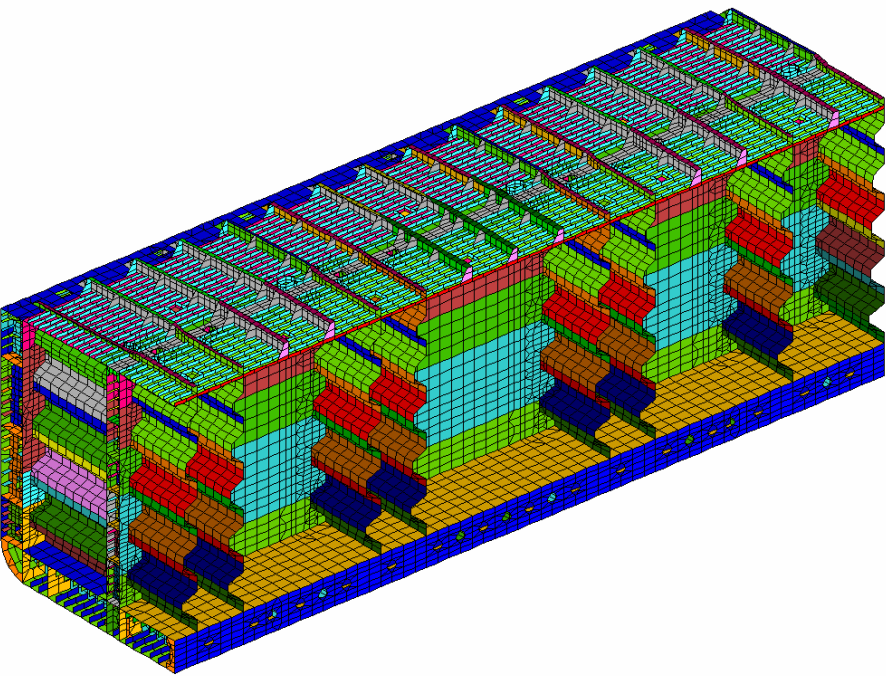
ABS + 1A1(E), Chemical and Oil Carrier SH, +AMS, +ACCU, OMBO, Ship type 1&2 (IBC CODE), ESP, VEC, R1, UWILD, COW.



DNV RULE STRENGTH CALCULATIONS



3D MODEL of CARGO HOLD REGION



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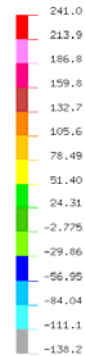
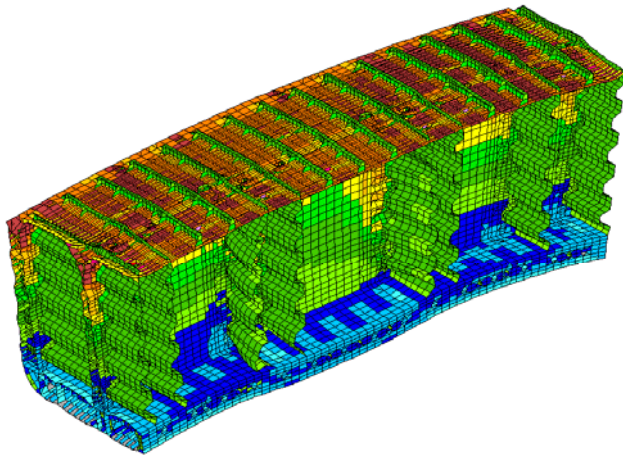


HULL STRUCTURE STRENGTH DIRECT CALCULATION (global strength)

DISPLAY III - GEOMETRY MODELING SYSTEM (12.0.0) PRE/POST MODULE

SXX - STRESSES

VIEW : -138.2195
RANGE : 241.024



EMRC-NISA/DISPLAY

SEP/25/06 13:20:19

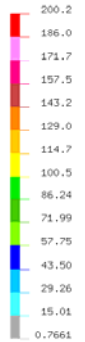
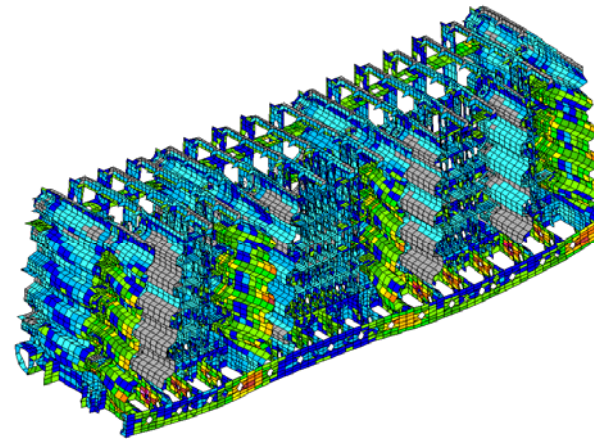


LC5Hog, Local LCS & Hogg (SMBH + 0.59 * VvBH)
588-III DSA of Modified Corrug. TBHds of Double Side

DISPLAY III - GEOMETRY MODELING SYSTEM (12.0.0) PRE/POST MODULE

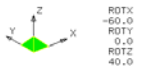
VON-MISES STRESS

VIEW : 1.230665
RANGE : 200.2047



EMRC-NISA/DISPLAY

SEP/25/06 14:02:05



LC1Sag, Local LC1 & Sagg (SMBH + 0.59 * VvBH)
588-III DSA of Modified Corrug. TBHds of Double Side



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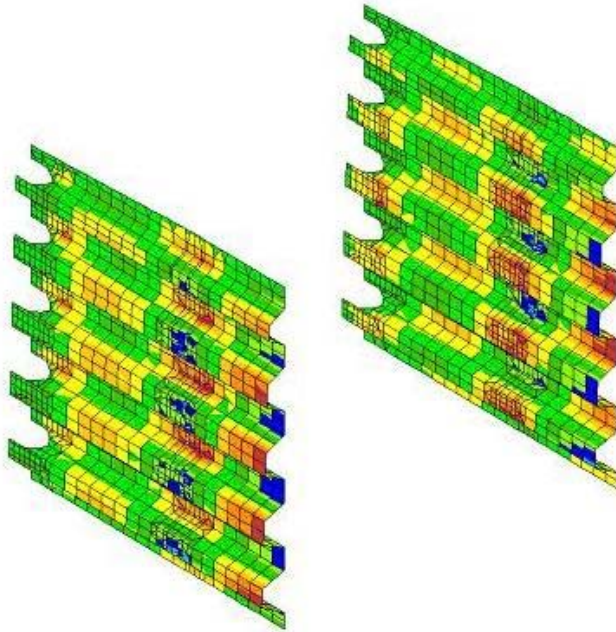
Stocznia Szczecińska NOWA

HULL STRUCTURE STRENGTH DIRECT CALCULATION (local strength)

DISPLAY III - GEOMETRY MODELING SYSTEM (12.0.0) PRE/POST MODULE

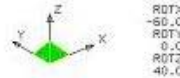
SYU - STRESSES

VIEW : -204.3837
RANGE: 244.0107



EMRC-NISA/DISPLAY

JUN/09/05 12:33:19



RDTX
-60.0
RDTY
0.0
RDTZ
40.0

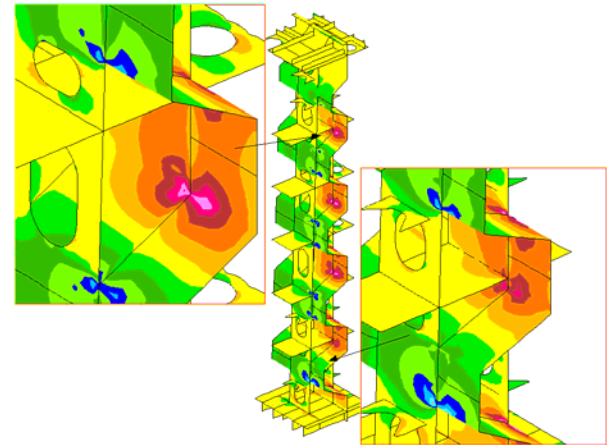


LC3, Local Loads(Harbour cond, Centre & Side tanks filled, Draught 0.35 D)
588-III DSA of Modified Corrug. TBHds of Caph. Str.(KEN)

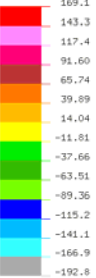
DISPLAY III - GEOMETRY MODELING SYSTEM (9.0.0) PRE/POST MODULE

SYU - STRESSES

VIEW : -1.442E+08
RANGE: 1.484E+08

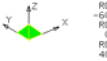


(Band * 1.0E6)



EMRC-NISA/DISPLAY

JAN/03/02 16:22:06



RDTX
-60.0
RDTY
0.0
RDTZ
40.0



LC4, Local Loads (Centre tank filled with adj.tanks empty, Actual draught)
898-III FINE MESH ANALYSIS OF TRANSV.COEFF. BHDS at Fr.95

95

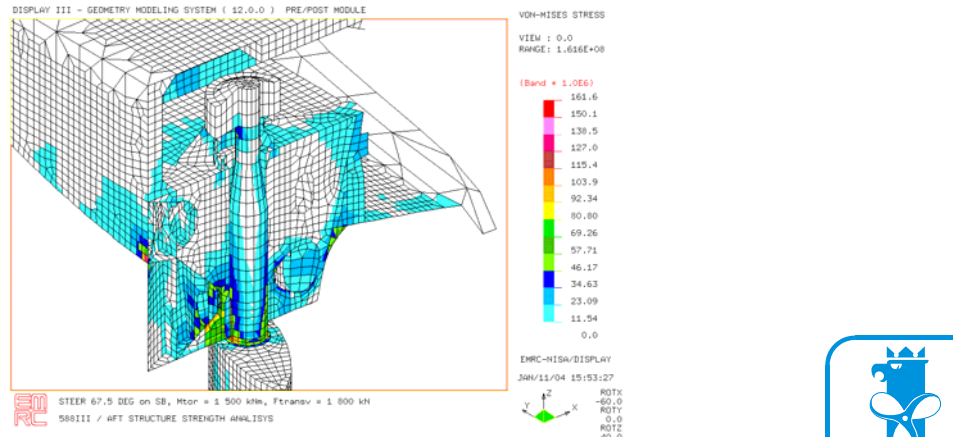
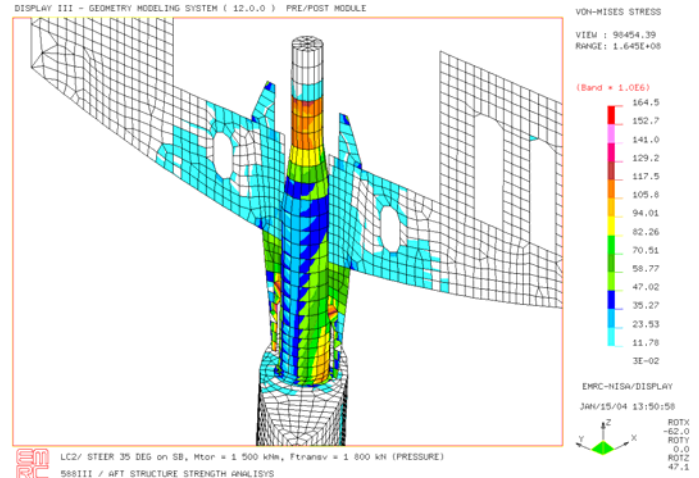
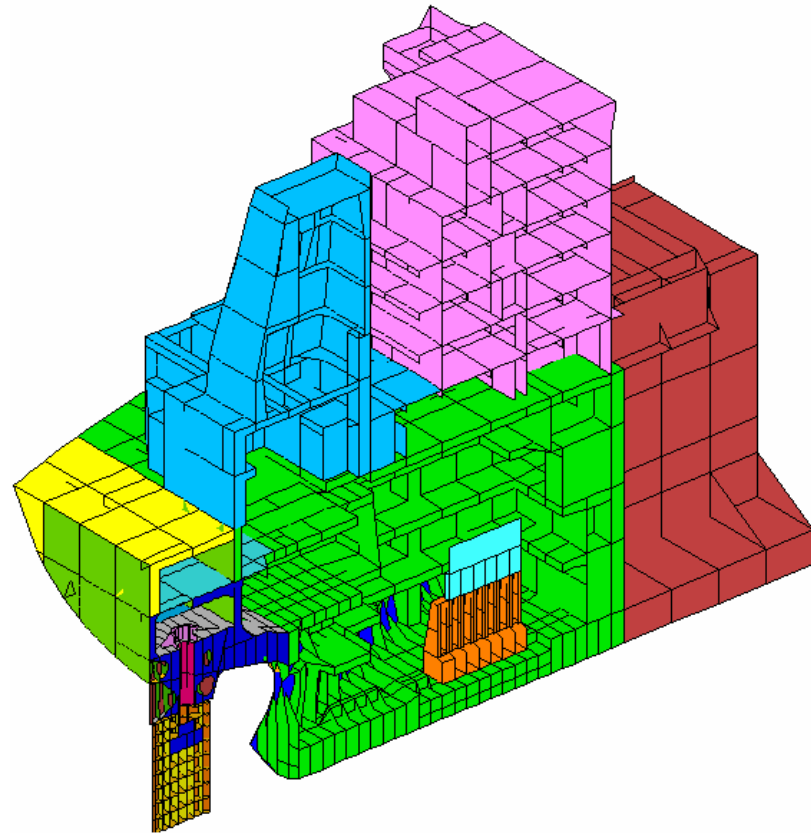


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HULL STRUCTURE STRENGTH DIRECT CALCULATION (aft region & steering gear)



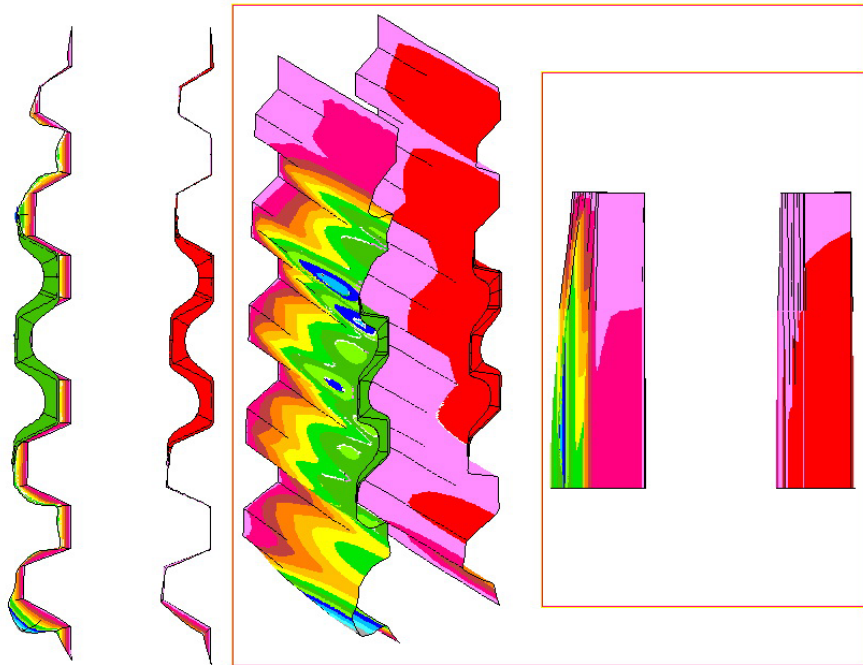
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HULL STRUCTURE STRENGTH DIRECT CALCULATION (due to modifications)

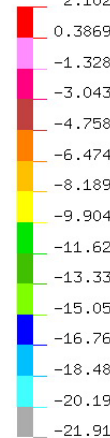
DISPLAY III - GEOMETRY MODELING SYSTEM (10.0.0) PRE/POST MODULE



X - DISPLACEMENT

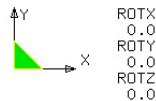
VIEW : -.0219095
RANGE : 0.002102

(Band * 1.0E-3)



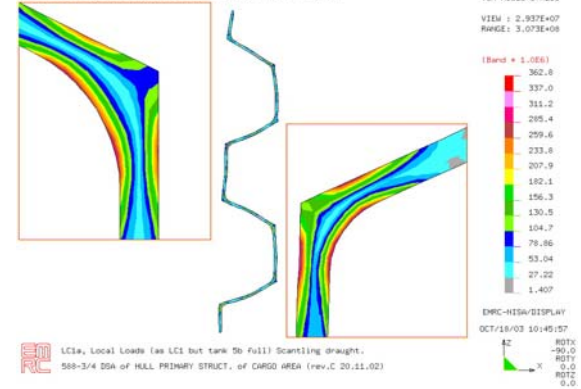
EMRC-NISA/DISPLAY

OCT/18/03 11:31:30

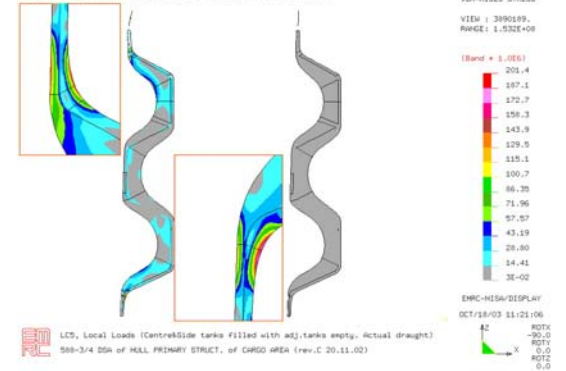


LC5, Local Loads (Centre&Side tanks filled with adj.tanks empty. Actual draught)
588-3/4 DSA of HULL PRIMARY STRUCT. of CARGO AREA (rev.C 20.11.02)

DISPLAY III - GEOMETRY MODELING SYSTEM (10.0.0) PRE/POST MODULE



DISPLAY III - GEOMETRY MODELING SYSTEM (10.0.0) PRE/POST MODULE

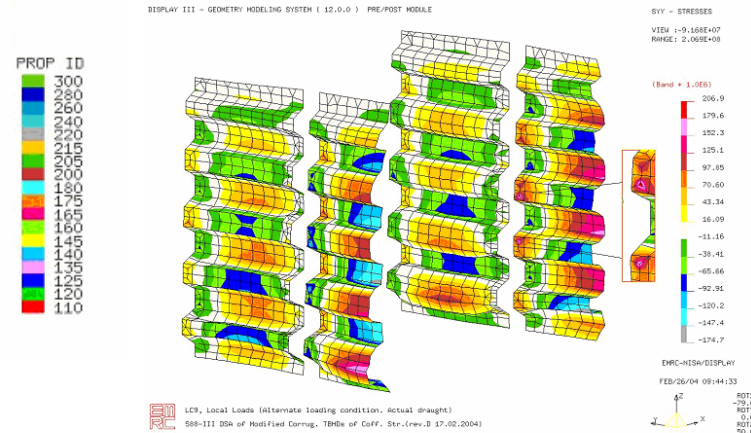
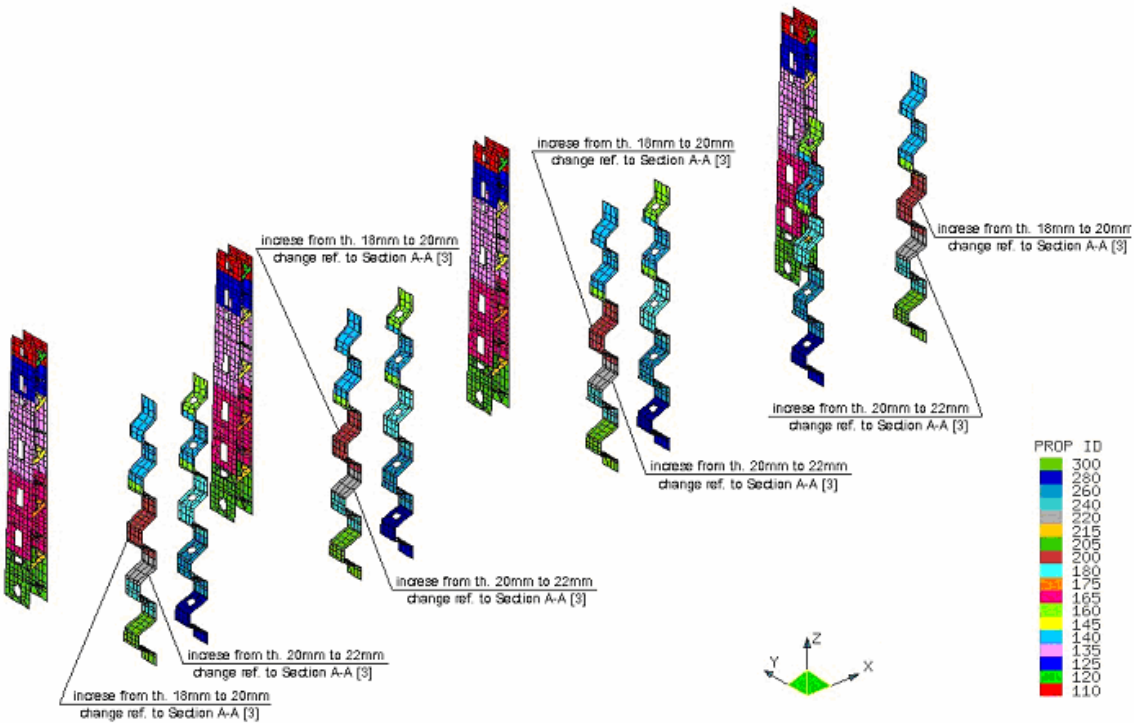


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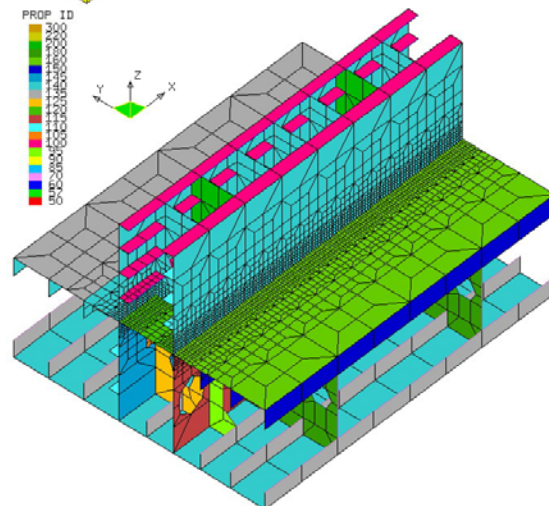
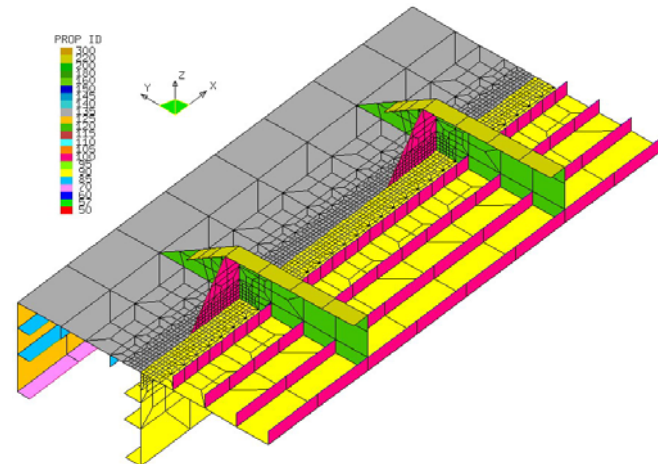
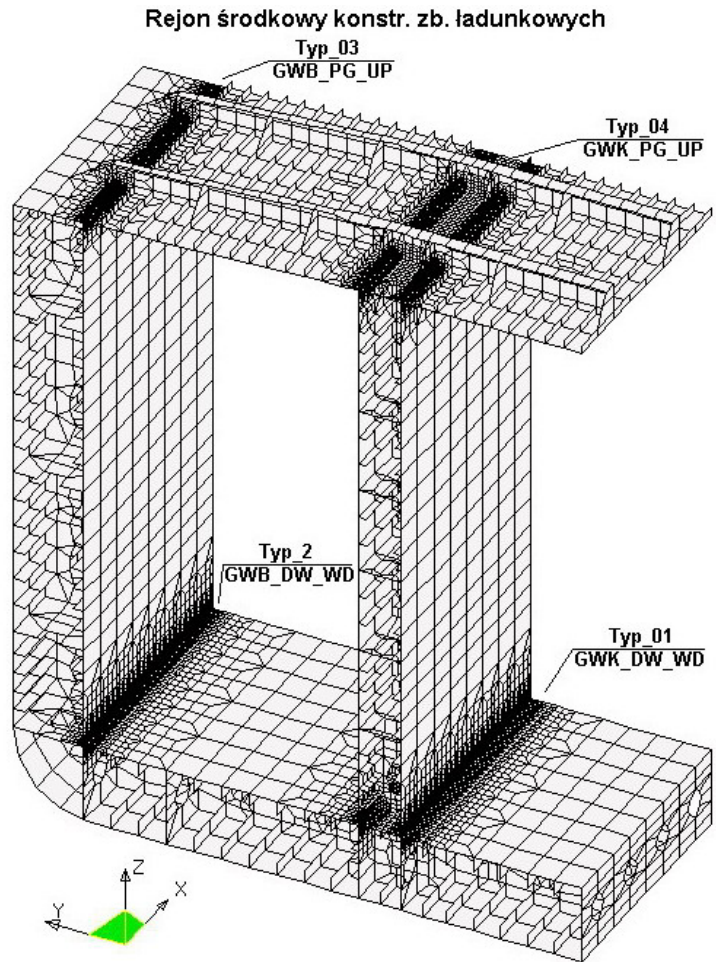
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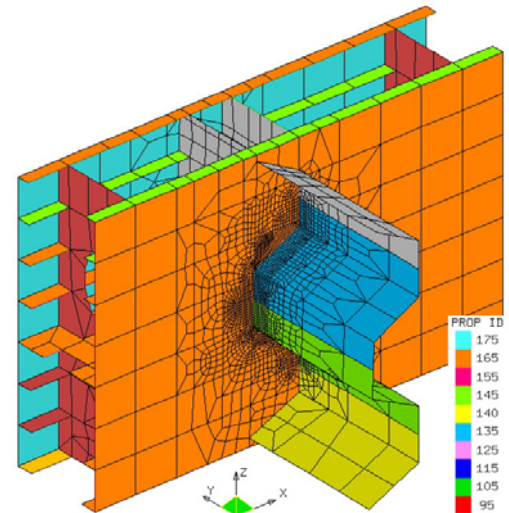
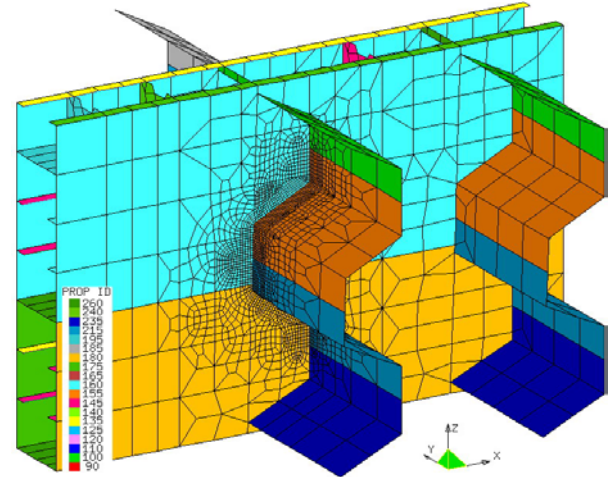
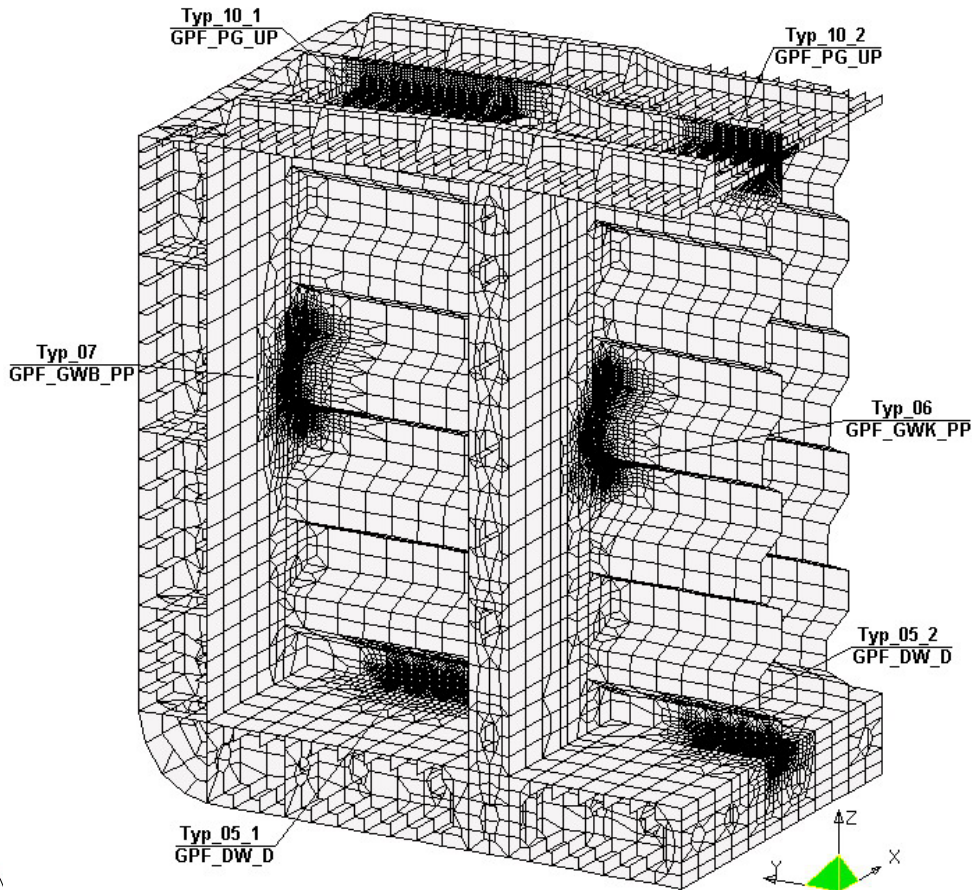
HULL STRUCTURE STRENGTH DIRECT CALCULATION (due to modifications)



HULL STRUCTURE STRENGTH DIRECT CALCULATION (fatigue strength)

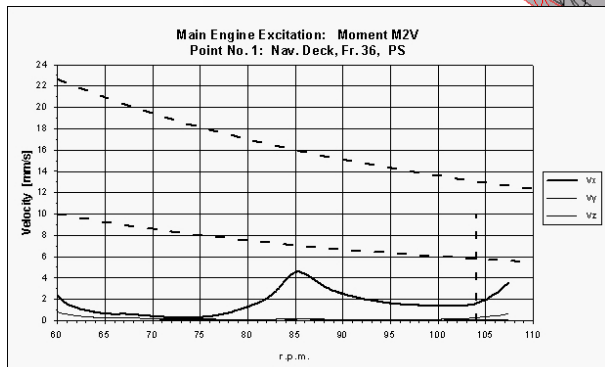
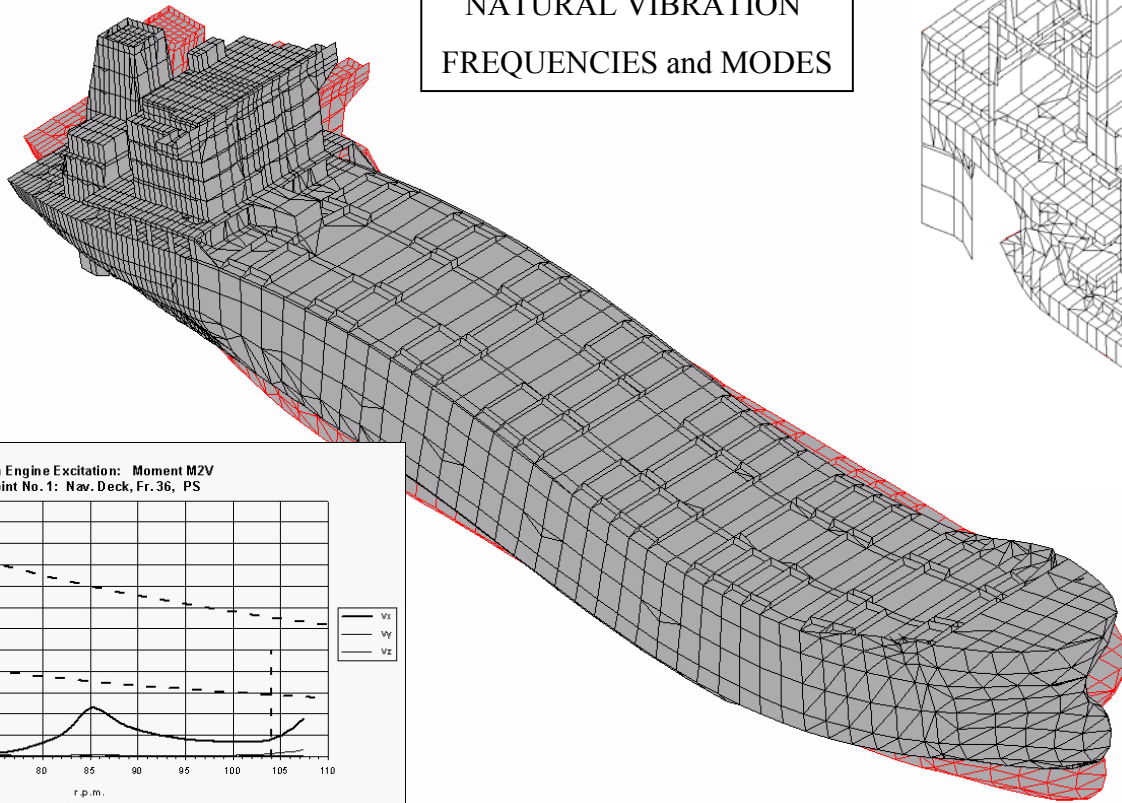
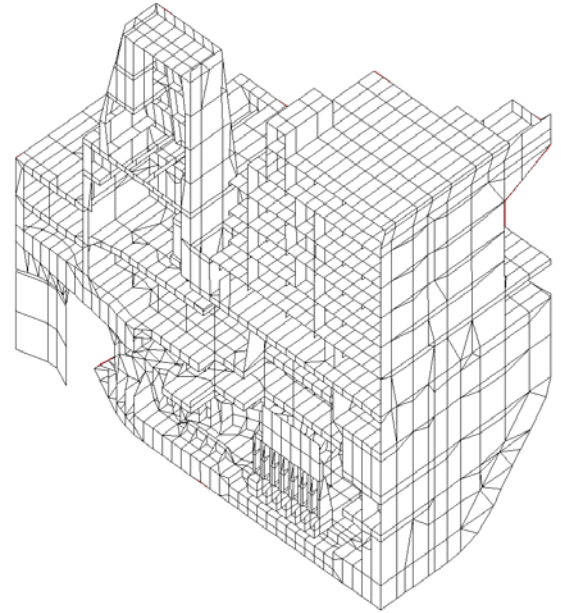


HULL STRUCTURE STRENGTH DIRECT CALCULATION (fatigue strength)



HULL and SUPERSTRUCTURE GLOBAL VIBRATION CALCULATION

NATURAL VIBRATION
FREQUENCIES and MODES



FORCED VIBRATION
RESPONSES to ME and PROPELLER EXCITATIONS

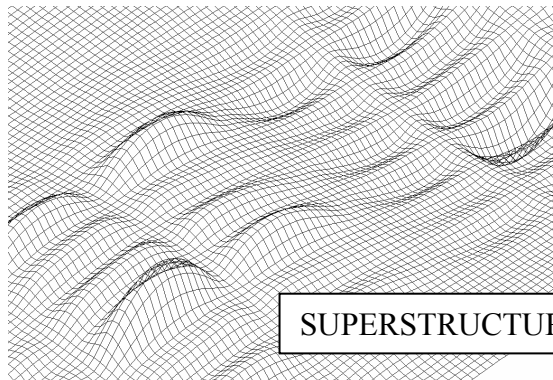


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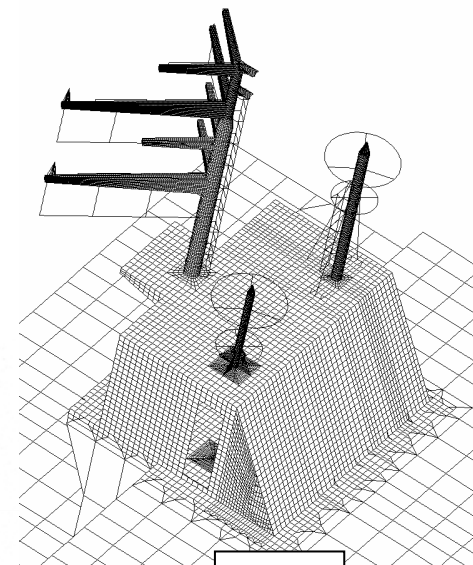
Stocznia Szczecińska NOWA



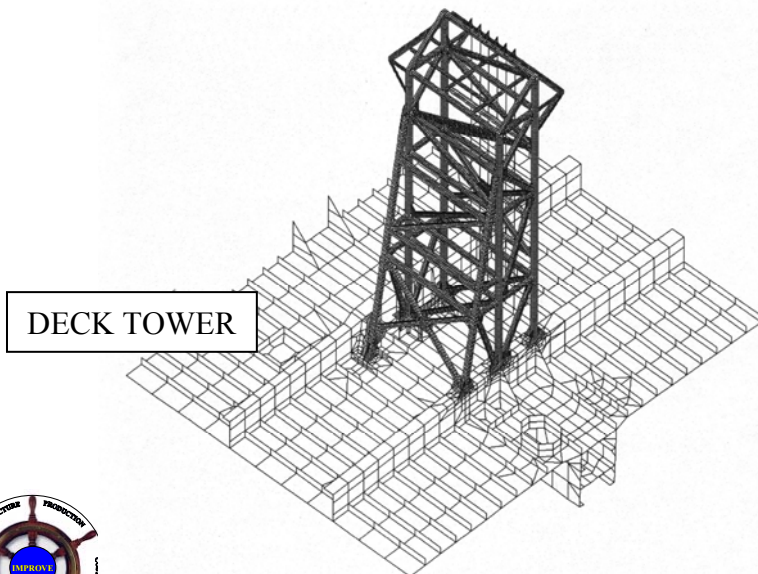
LOCAL STRUCTURE VIBRATION CALCULATION



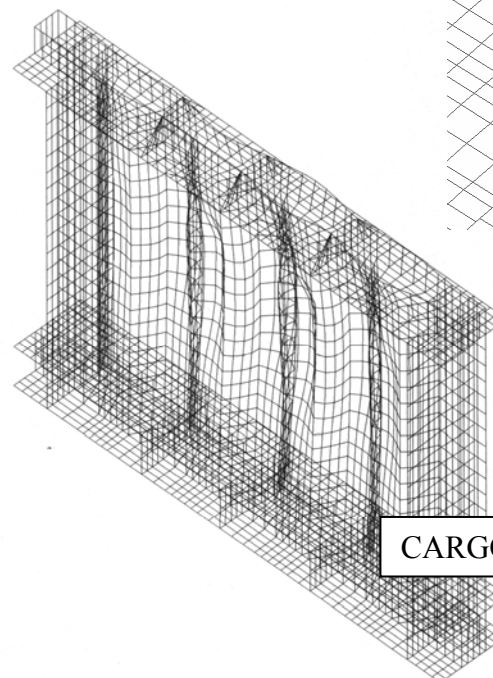
SUPERSTRUCTURE DECK



MAST



DECK TOWER

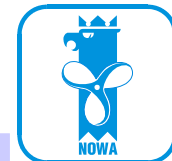


CARGO TANK BULKHEAD



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SOFTWARE TOOLS APPLIED in CHEMICAL TANKER DEVELOPMENT

- Naval Architecture Soft.: **NAPA**
- Rule based structural design: **SAFEHULL, NAUTICUS**
- Hull structure design and modelling: **TRIBON**
- Direct Strength calculation: **EMRC NISA II (FEM)**
- Global and local vibration calculation: **EMRC NISA II (FEM)**



IMPROVED PRODUCT DESIGN of CHEMICAL TANKER

Use tools and methodologies developed within **IMPROVE** for:

- Improved Rules-based design
- Rearrangement of ship space (different number of cargo tanks)

Targets to achieve:

- Minimize material consumption, especially DUPLEX steel
- Minimize steelworks, especially welding of DUPLEX steel



Thank You for Your Attention !



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