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

2 October 2006
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 SZCZECINSKA NOWA
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
TYPICAL MIDSHIP SECTION
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,
  1.25 t/m³ for wing tanks
  1.70 t/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
HULL STRUCTURE STRENGTH
DIRECT CALCULATION (global strength)
HULL STRUCTURE STRENGTH
DIRECT CALCULATION (local strength)
HULL STRUCTURE STRENGTH
DIRECT CALCULATION (aft region & steering gear)
HULL STRUCTURE STRENGTH
DIRECT CALCULATION (due to modifications)

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

X - DISPLACEMENT
VIEW: -0.019995
RANGE: 0.002102

LCS, Local Loads (Central Side tanks filled with adj. tanks empty. Actual draught)
585-3/4 ISM of HULL PRIMARY STRUCT. of CARGO AREA (rev.C 20.11.02)
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
LOCAL STRUCTURE VIBRATION CALCULATION

SUPERSTRUCTURE DECK

DECK TOWER

MAST

CARGO TANK BULKHEAD
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!