

NSRP Production Design & Materials Technology Meeting 25-26 September 2007



Naval Vessel Rules Update



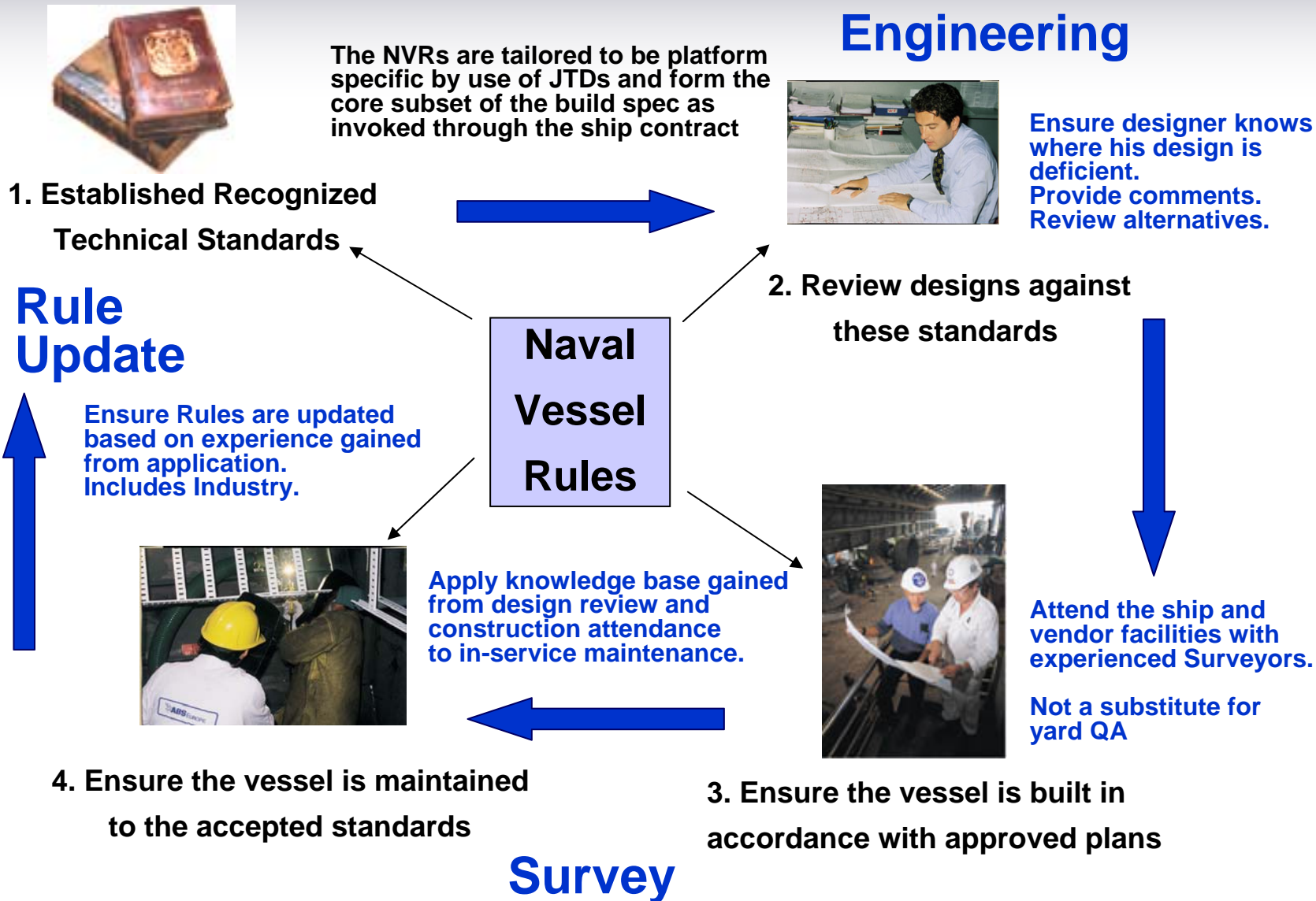
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ABS Washington Office

What is Classification?

A classification society's job is to perform a third party, independent assessment of the degree to which a vessel or other marine structure complies with an established set of technical criteria



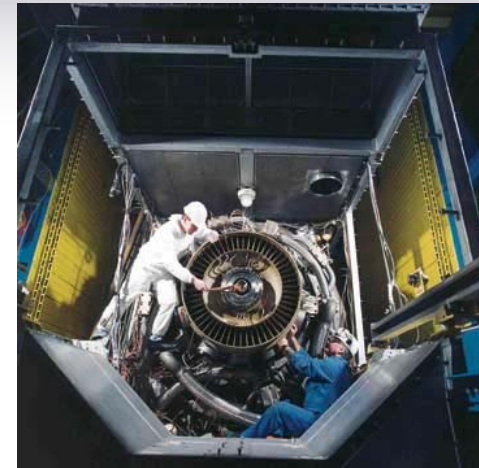
Class Is An Integrated, Closed Loop Process



What Does Class Cover?

Systems & Equipment Covered

- Hull and Structures
- Propulsion and Maneuvering Systems
- Electrical Systems
- Control and Navigation
- Auxiliary Systems
- Habitability and Outfit
- Materials and Welding



Processes Covered

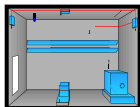
- Establishing Technical Baseline
- Design Review
- Material Certification
- Vendor Equipment Certification
 - Diesel Engines, Gas Turbines, Generators
 - Switchboards and other critical equipment
- Construction, Testing and Trials
- In-service Maintenance, Repair and Modification

Primarily related to safety of ship and personnel.

Not mission systems

Structures and Marine Systems

Military Unique Systems



What Class is Not

Class does not replace the Owner's involvement

Provides independent assessment of compliance with the technical baseline

Class does not address everything – only what's addressed in the NVRs

Allows Navy resources to focus on critical items

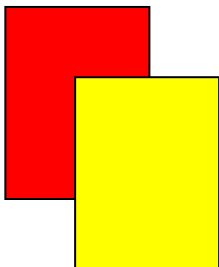
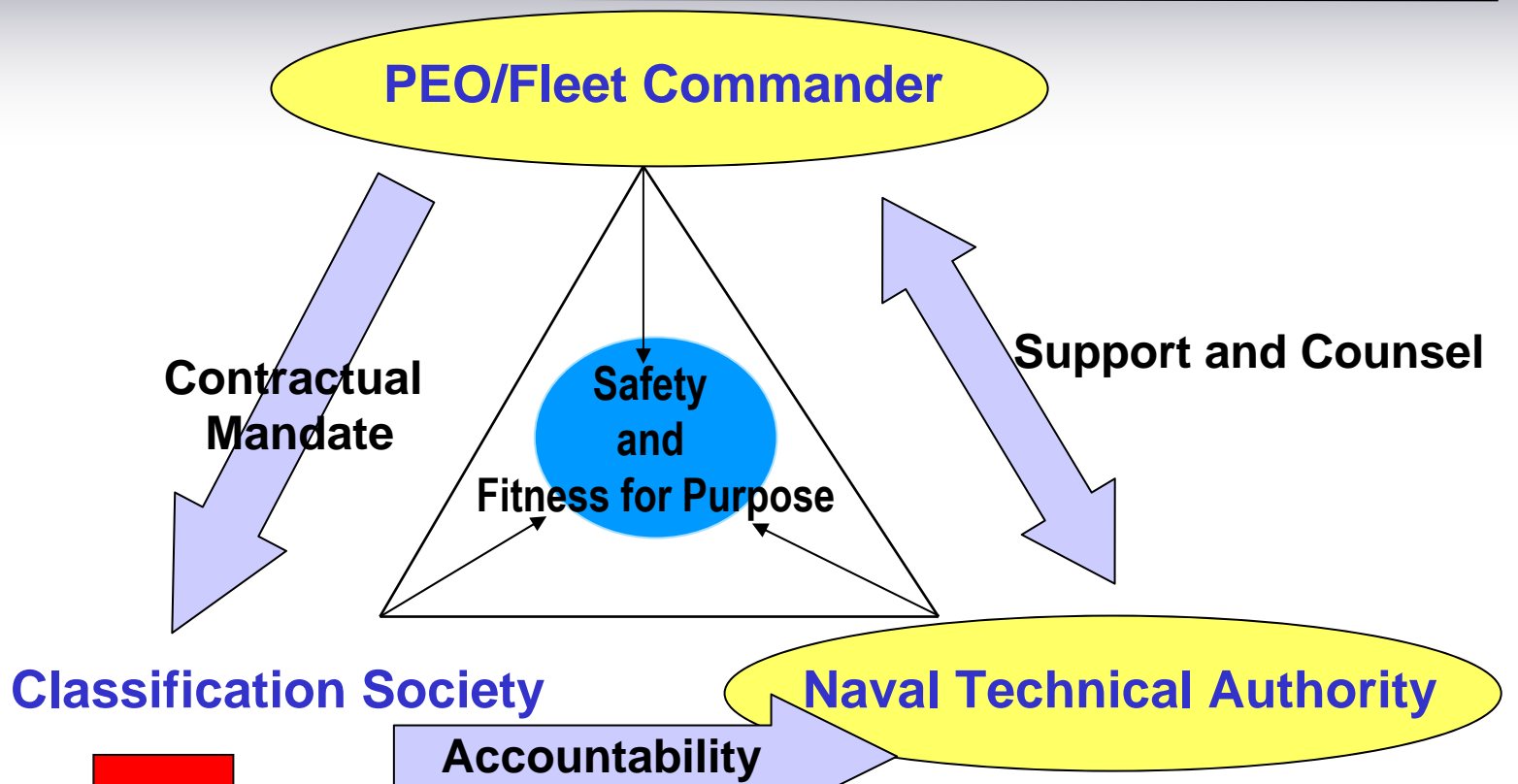
Class does not replace the design process

Surveyors are not a replacement for a Quality Assurance Department

The NVRs (Rules) are not a build spec



Value Added



To provide an independent assessment as to the degree to which the platform complies with the criteria established in the Rule set. At times this will support the position of the PEO; at others, the position of the NTA and at others, that of the industry.

A tool to guard against compromise or gold-plating.



Naval Programs – Work in 2007

T-AKEs at NASSCO
T-AOE transfers
T-AGM(R) will be ABS classed
NOAA FRVs at VT Halter
NOAA SWATH
Army LSVs at VT Halter
JHSV will be ABS classed
DDG-1000 to be ABS classed
LCS being ABS classed
LHD-8 engine certs and survey attendance
LPD engine certs
MPF(F) platforms to be ABS classed
 LMSRs, T-AKEs, MLPs, LHARs, LHDs
SBX MDA Platform ABS classed
SEA FIGHTER ABS classed
ONR E-Craft to be ABS classed
HSV-2 classed to ABS
DEEPWATER NSC 3-8 to be ABS certified
DEEPWATER OPC to be ABS classed
DEEPWATER FRC to be ABS classed
All current Army Corps of Engineers Projects
TWR to be ABS classed
YPs to be ABS classed
Egyptian Fast Missile Craft to be ABS Classed
Egyptian Patrol Craft
Oman Patrol Craft to be ABS Classed
Mexican Patrol Craft
Indian Patrol Vessels to be ABS Classed
Canadian Navy YAP to be ABS Classed



Naval Vessel Rules

Stability
Structures
Propulsion Systems
Electrical Systems
**Controls, Navigation and
Communication Systems**
Auxiliary Systems
Habitability and Outfitting
Materials



The baseline technical standards for H,M&E on naval combatants

Foundation for the naval combatant certification process

NVR Organization

- **Part 0 - General Provisions**
- Chapter 1 General Application of Naval Vessel Rules
- Chapter 2 Classifications
- Chapter 3 General Technical Requirements
- Chapter 4 Approvals, Surveys and Requirements During Design and Construction
- Chapter 5 Subdivision and Stability
- Chapter 6 Reliability and Maintainability
- Chapter 7 Human Systems Integration
- Chapter 8 System Safety
- Chapter 9 General Arrangements
- Chapter 10 Design and Build Margins
- **Part 1- Hull and Structure**
- Chapter 1 General Provisions
- Chapter 2 Structural Fire Protection
- Chapter 3 Hull Structural Requirements
- Chapter 4 Composite Hull Construction
- Chapter 5 Structural and Non Structural Closures
- Chapter 6 Hull Testing



NVR Organization cont'd

- **Part 2 Propulsion and Maneuvering Systems**
- Chapter 1 General Provisions (including machinery arrangements)
- Chapter 2 Diesel Engines
- Chapter 3 Gas Turbines
- Chapter 4 Transmission Systems (Gears, Shafting and Propellers)
- Chapter 5 Waterjets and Thrusters
- Chapter 6 Propulsion Redundancy
- Chapter 7 Boilers, Pressure Vessels and Fired Equipment
- **Part 3 Electrical Systems**
- Chapter 1 General Provisions
- Chapter 2 Systems design
- Chapter 3 Electrical Equipment
- Chapter 4 Shipboard Installation and Tests
- Chapter 5 High Voltage, Electric Propulsion and DC Systems
- **Part 4 Control and Navigation Systems**
- Chapter 1 General Provisions
- Chapter 2 Ship and Machinery Control and Automation Systems
- Chapter 3 Navigation



NVR Organization cont'd

- **Part 5 Auxiliary Machinery Systems**
- Chapter 1 General provisions
- Chapter 2 Piping Systems
- Chapter 3 Heating, Ventilation and Air Conditioning Systems
- Chapter 4 Firefighting Systems and Damage Control
- Chapter 5 Deck Systems
- Chapter 6 Underway Replenishment Systems
- Chapter 7 Environmental Protection Systems
- **Part 6 Habitability and Outfit**
- Chapter 1 General Provisions
- Chapter 2 Accommodations and Workspaces
- Chapter 3 Whole-Body Vibration
- Chapter 4 Airborne Noise
- Chapter 5 Indoor Climate
- Chapter 6 Lighting
- **Part 7 Military Environment**
- Chapter 1 General Provisions
- Chapter 2 Weapons Effects Design Considerations
- Chapter 3 Signature Reduction Design Considerations



NVR Organization cont'd

- **Part 8 Materials and Welding**
- Chapter 1 Materials for Hull Construction
- Chapter 2 Materials for Machinery
- Chapter 3 Welding and Fabrication
- Chapter 4 Coatings and Corrosion Control
- **Part 9 Survey After Construction**
- Chapter 1 Conditions for Survey After Construction
- Chapter 2 Survey Intervals
- Chapter 3 Hull Surveys
- Chapter 4 Drydocking Surveys and Underwater In Lieu of Drydocking Surveys
- Chapter 5 Tailshaft Surveys
- Chapter 6 Machinery Surveys
- Chapter 7 Survey of Ship Repairs and Alterations
- Chapter 8 Lay-Up Survey and Reactivation of Laid-Up Ships
- Chapter 9 Survey Requirements for Additional Systems and Services
- **USCG Appendix**



Applying the NVR's

- The NVR's have been applied to the 2 LCS variants and to the DDG-1000.
- This has provided an experiential basis for the shaping of certain processes.
- A learning process for all:
 - ABS
 - The PEO
 - The NTA
 - The Integrator
 - The Designer
 - The Shipyard
 - Beginning for Fleet



Challenges

Established “Cultures”

1. Getting past fear and comfort
2. Understanding value – third party process

Committing to the process

1. Understanding the role of the class society
2. Empowering the class society
3. Institutionalizing the process

Communications

1. Open discussion of technical issues
2. Focus on customer expectations rather than contractual compliance
3. Acceptability as opposed to strict compliance



Keeping Vessels in Class



LCS Sea Frame – Unique Risk

The price of high speed is living in a box (manage like an airframe)

Lightweight Structure with Little Margin

Monitoring required to stay in the box

Recent Examples:
HSV SWIFT
FSF-1 SEA FIGHTER

Severe Seaway Loading & Slamming



Safe Operating Envelope and Expected Ship Life

Designed Number of Cycles

Potential for Hull Cracking or Extensive Damage

Potential for Dramatically Reduced Ship Life

Fatigue Limits & Constant Surveillance for Cracks

Potential for Significant A_0 Impacts

Potential for substantial repair cost exposure



Retention in Class – A Risk Mitigater

Technical Insight

Comprehensive understanding of the technical baseline

Experience with high speed craft

Safe Operating Envelope concept

A fatigue sensitive platform

Fine structural margin

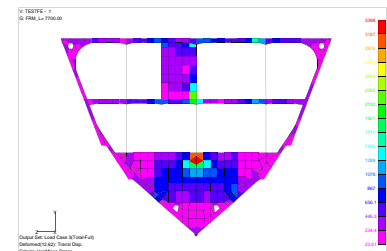
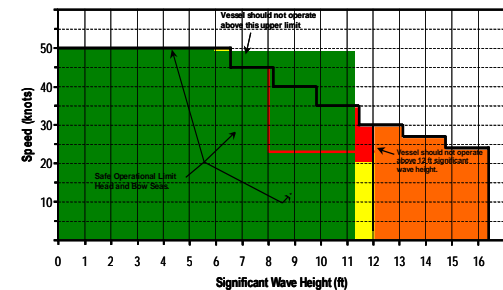
Dynamic stability sensitivity

Tracking viability of proposed changes

Use of alternative materials and unique hull forms

Access to vendor data

Awareness of repair facility capabilities



Retention in Class – A Risk Mitigater

Process Enabler

- **Periodic, structured, documented assessment of the continuing compliance to the baseline technical criteria**
- **Consistent application of assessment criteria throughout life by a committed organization familiar with criteria and the platform**
- **Assessment conducted by independent third party**
- **Minimizes intrusiveness and impact**
- **Navy remains the decision-maker - retains Technical Authority**
- **Assets already pre-deployed**
- **Continuous improvement to the Rules**
- **Complements INSURV**



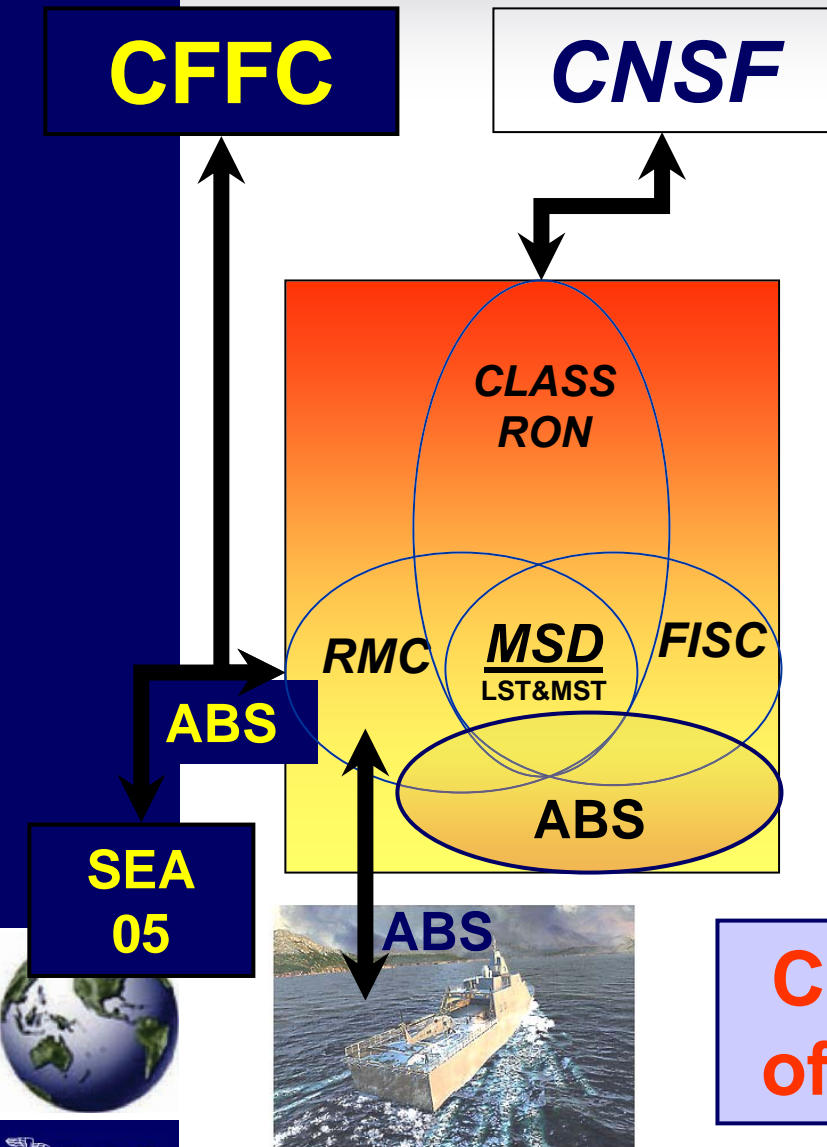
Survey After Construction

Surveyor to

establish vessel being maintained iaw the Rules
modifications being accomplished iaw the Rules



ABS – NAVY Relationship



- ABS: 'eyes' of SEA05
- ABS assists PE
- ABS supports RMC
- ABS supports shipbuilding
- ABS supports FLEET OPS
- ABS is active 'third party' check and balance of entire process
- ABS Complements INSURV

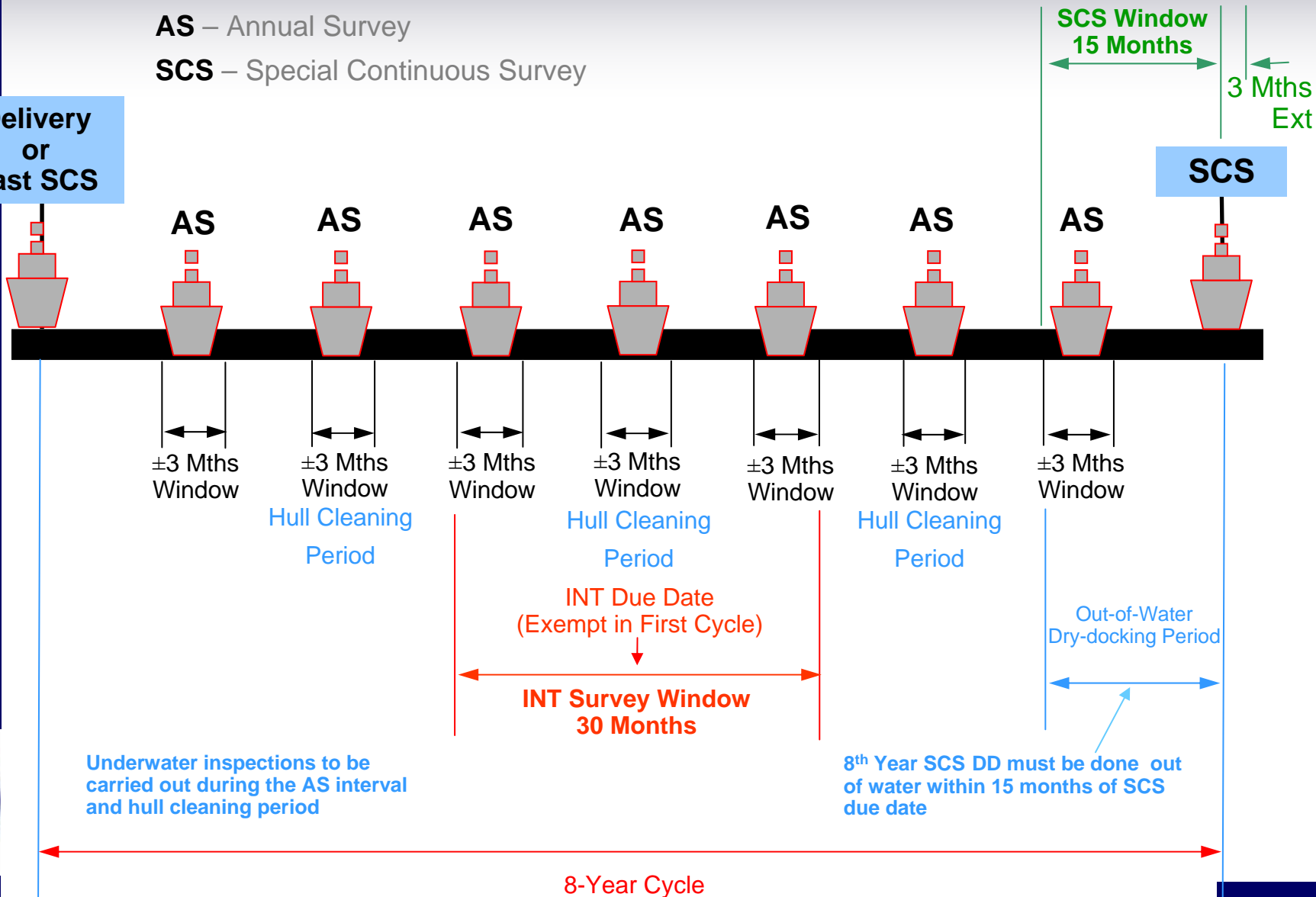
Class enhances effectiveness of existing Navy infrastructure

Survey After Construction

AS – Annual Survey

SCS – Special Continuous Survey

Delivery
or
Last SCS



Survey After Construction

Periodicity must be established for each platform

- **Annual Survey**
 - General review of entire platform
 - Focused attention to areas of high interest or concern
 - Accomplishment of proportioned continuous survey items
- **Intermediate Survey/s**
 - Mid-period survey
 - Includes annual items
 - Underwater areas



Survey After Construction

- **Drydocking Survey**

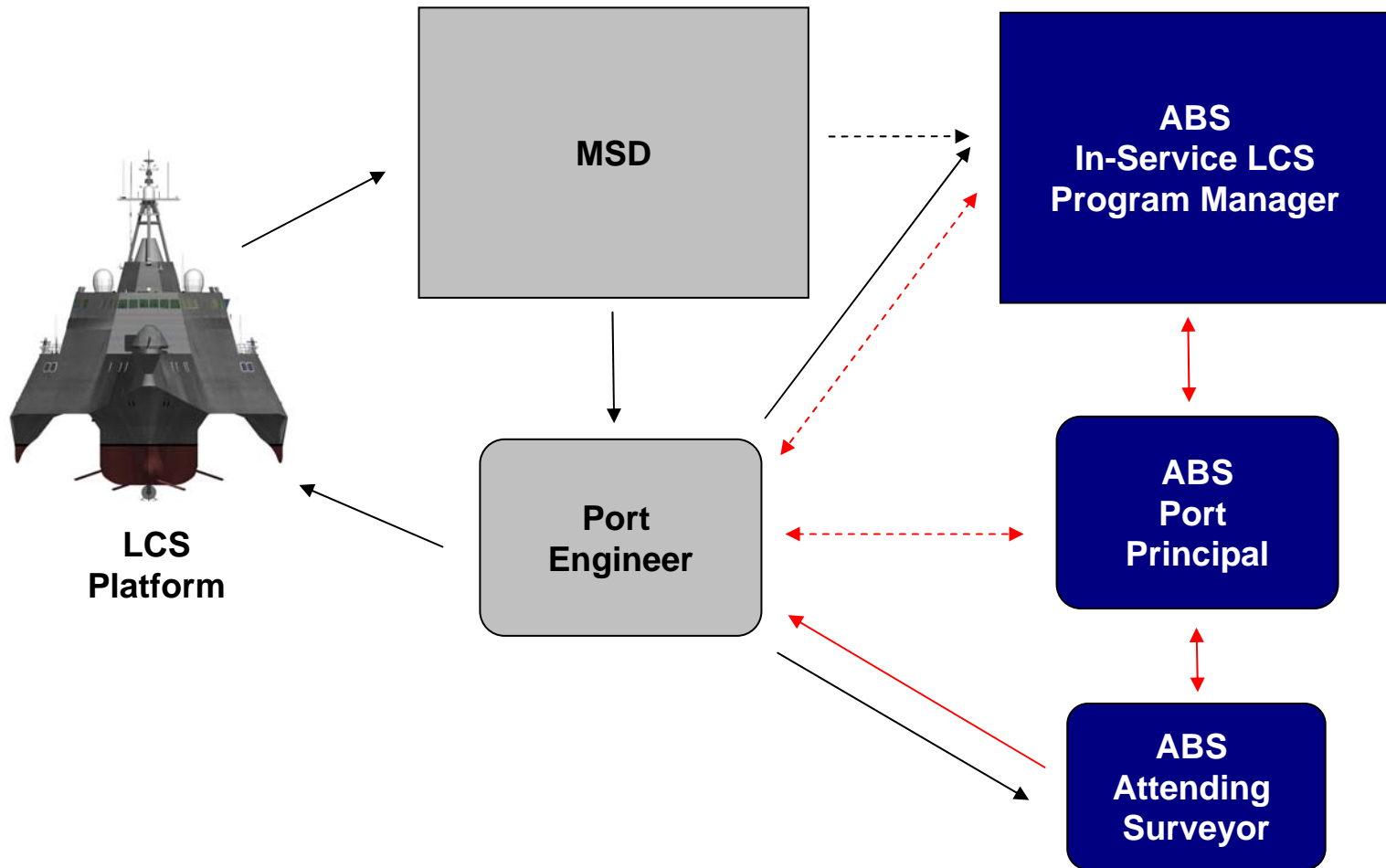
- Specialized materials and reduced scantlings warrant more frequent underwater hull examination
- Will be established to conform with Navy plans and will conform with Continuous Survey Cycle
- Includes gaugings, appendages, hull openings, etc.

- **Special Continuous Survey**

- Continuous Survey of Hull & Machinery
- Apportioned percentage of hull & machinery items due each year with 100% completed at end of cycle
- Agreed-upon items may be examined and recorded by the crew or Port Engineer followed by verification by ABS during next scheduled survey
- Utilization of Risk Based Inspection or Reliability Centered Maintenance techniques may be an option



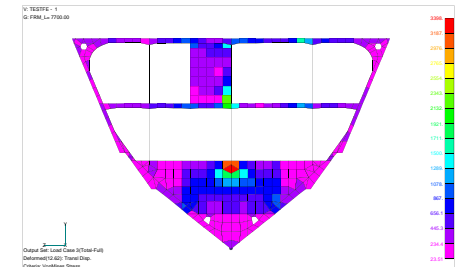
Mechanics of the Process



Survey After Construction

Survey Activities

- Develop a Survey Plan
 - Of primary importance to ensure success
- Support to Surveyor
 - Access to all survey data related to ship
 - Engineering expertise available 24/7
- Post Survey Activities
 - Immediate report to ship's personnel
 - Documented report available on line within 4 days
- Reports and Access to Data
 - SafeNet Survey Status available on-line



Survey Name	Status	Start Date	End Date	Location	Report Number	Report
Annual Hull Survey 1	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_1	
Annual Hull Survey 2	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_2	
Annual Hull Survey 3	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_3	
Annual Hull Survey 4	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_4	
Annual Hull Survey 5	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_5	
Annual Machinery Survey 1	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_1	
Annual Machinery Survey 2	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_2	
Annual Machinery Survey 3	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_3	
Annual Machinery Survey 4	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_4	
Annual Machinery Survey 5	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_5	
Annual Life Line Survey 1	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_1	
Annual Life Line Survey 2	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_2	
Annual Life Line Survey 3	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_3	
Annual Life Line Survey 4	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_4	
Annual Life Line Survey 5	Completed	23 Jul 2015	24 Jul 2015	Houston, TX	100077641_5	



Data Access

- Data management system provided with classification
- Main purpose is to maintain vessel status
- Provides the Navy the ability to review their vessel's survey schedules, particulars, outstanding reqs
- Recommendations, items credited, and survey history
- Vital tool in managing and scheduling class surveys
- Accessible through the world-wide web through a secure link virtually anywhere in the world



SafeNet - Surveys

SafeNet for Owners - Microsoft Internet Explorer provided by ABS

ABS SAFENET Company Information | Marine Information | Help | Close

SCHEDULED SURVEYS - ALL

Name: CDC CONTAINER CARRIER Class Number: 02222220 IMO Number: 02222220 Status: In Operation, Active, Classed

Surveys | Attendances | Parts | Findings | Certificates | Timeline | Details | Comments | IACS | Reports

Scheduled | In Progress | History | Future

Due States: All Overdue Overdue within 180 days Overdue after 180 days Survey complete pending review

indicates survey requested or in progress.

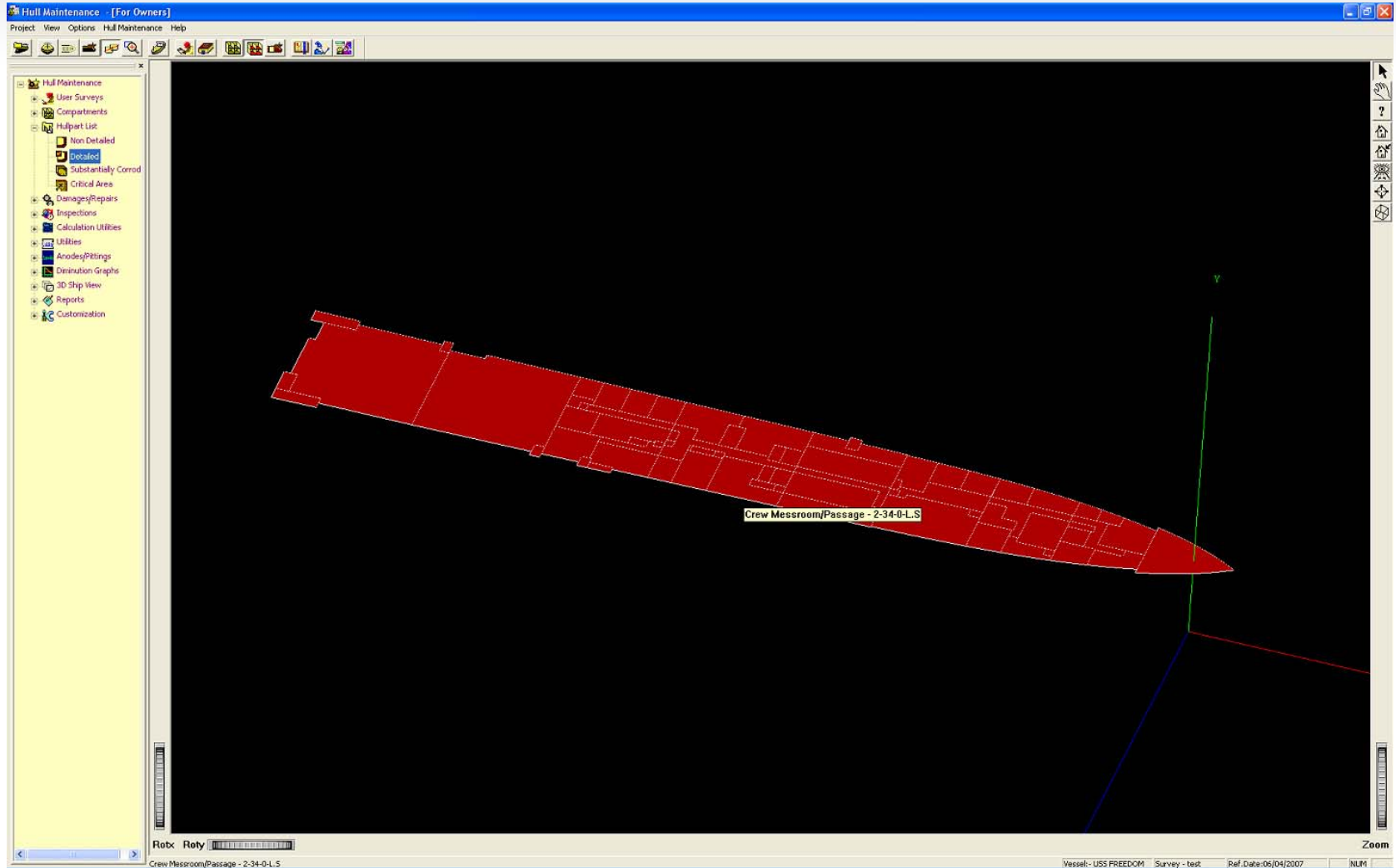
Survey Name	Status	Interval	Last Visit Date	Due Date	Range Date	Extended Date
Classification						
Annual Automation Survey 4	✓	12		01 Jun 2006	01 Mar 2006 - 01 Sep 2006	
Annual Hull Survey 4	✓	12		01 Jun 2006	01 Mar 2006 - 01 Sep 2006	
Annual Machinery Survey 4	✓	12		01 Jun 2006	01 Mar 2006 - 01 Sep 2006	
Boiler Survey - Aux. Fired Boiler		36		31 May 2007		
Boiler Survey - Exhaust Gas Boiler		36		31 May 2007		
Drydocking Survey		36		31 May 2007		
Special Periodical Survey - Automation 1	✓	60		31 May 2007	28 Feb 2006 - 31 May 2007	
Special Periodical Survey - Hull 1	✓	60		31 May 2007	28 Feb 2006 - 31 May 2007	
Special Periodical Survey Machinery 1	✓	60		31 May 2007	28 Feb 2006 - 31 May 2007	
Tailshaft Survey - Propeller Shaft - Oil	Extended	36		31 May 2005		31 Oct 2007
Statutory						
Annual Carriage of Dangerous Goods Survey 4	✓	12		31 May 2006	28 Feb 2006 - 31 Aug 2006	
Annual IAPP Annex VI Survey 4	✓	12		31 May 2006	28 Feb 2006 - 31 Aug 2006	
Annual IOPP Annex I Survey 4	✓	12		01 Jun 2006	01 Mar 2006 - 01 Sep 2006	
Annual Load Line Survey 4	✓	12		01 Jun 2006	01 Mar 2006 - 01 Sep 2006	
Annual Safety Construction Survey 4	✓	12		31 May 2006	28 Feb 2006 - 31 Aug 2006	
Renewal Carriage of Dangerous Goods Survey 1		60		31 May 2007	28 Feb 2007 - 31 May 2007	

Local intranet

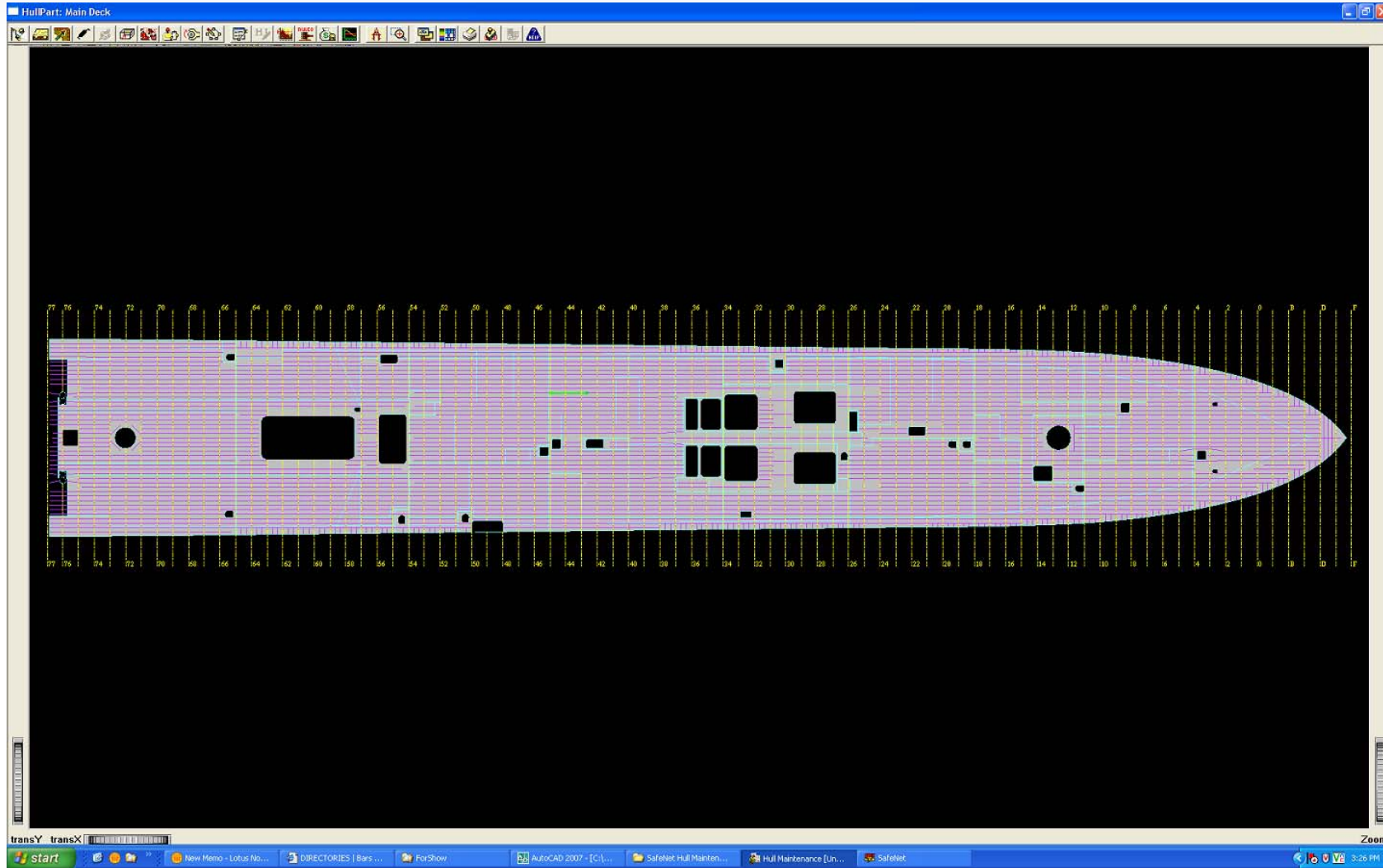
start > Re: Na... Navy Pro... Navy-AB... ABS Offic... SafeNet F... 10:21 AM



Example of Hull Maintenance Module



Example of Hull Maintenance Module



Example of Hull Maintenance Module

The screenshot displays the 'Hull Maintenance' software interface. The main window shows a 3D model of a ship's hull structure. A dialog box titled 'Stiffer Information : Life Calculation using Linear algorithm' is open, displaying the following data:

Stiffer Information : Life Calculation using Linear algorithm			
Stiffer	Label: Stiffer - 1000 : 885	Build Date: 06/04/2007	
Type: MT 3x2 2		Gauged Date: 06/04/2007	
Allow Cor: 25.0	%	Slenderness Ratio	
Material: Structural Steel A		Web (h/v): 0.0	
Stiff Letter: No	Edit	Flange (b/v): 0.0	
Compartment Info			
Side: Below	Compartment: Chief Petty Officer Mess Room & Lounge - 2-40		
Special Comments			
This stiffer has no Special Comments Associated with it.			
Points: 2			
#	X (m)	Z (m)	
1	-55.989	5.2	
2	-60.2	5.2	
Number of Pictures: 0			
History		Properties	
Properties		Ok	

The interface also shows a 3D model of the hull structure in red, a coordinate system (transY, transX, Rotx, Roty), and a status bar at the bottom with the following information:

Reference Date: 06/04/2007, Survey: test, Start Fr: F = 8.400 m and End Fr: 77 = -107.800 m, Vessel: USS FREEDOM, Survey: test, Ref. Date: 06/04/2007, NLM



Example of Hull Maintenance Module

Pitting Area

Pitting Area ID: 1010:1 Name: Pitting Area_Distance above B.L. 0.289 M.

Creation Date: 09/27/2004 Created By: spd

Description: Pitting Area on 'FRAME 074' 21.831 M. off C.L. (S) 0.289 M. above B.L.

Location

#	Z	Y
1	22.502	2.183
2	23.094	2.183
3	23.094	0.289
4	21.831	0.289
5	21.851	0.624

Affected Plates

#	Item ID	Status
1	Plate 1000 : 753	<input checked="" type="checkbox"/>

Ok Finding Cancel

transY transX

Reference Date: 09/27/2004, Survey: sample S.Fr: 74=14



Discussion

