ATENA roma
ASSOCIAZIONE TECNICA NAVALE

La nave al centro dell'economia e dei trasporti

VI° seminario Trasporto e Logistica

Piazza SS. Apostoli, 66, Roma 8 marzo 2019 09.30
registrazione partecipanti ore 09.00

Seminario organizzato da

AAG Editori srl in collaborazione con CONFITARMA Confederazione Italiana Armatori

Evoluzione delle unità navali: specializzazione, dimensione, tecnologie di bordo

A.I.C. (GN) Aus. Stefano Tortora

Roma, 8 Marzo 2019

L' ATENA - "Associazione Italiana di Tecnica Navale"

- *Si origina nel 1911 dal 1° Convegno Nazionale del «Collegio degli Ingegneri Navali e Meccanici»*
- *Fondata a Genova il 15 Marzo 1974 con 72 soci*
- *Oggi conta 12 sezioni territoriali ed oltre 800 soci*

Obiettivi di ATENA:

- *Diffondere la cultura marinara*
- *Operare con impegno in una dimensione Europea nel settore del cluster navale e marittimo*
- *Promuovere il progresso scientifico e tecnico:*
  - *Costruzioni Navali*
  - *Esercizio e la conduzione delle navi*
  - *Metodi di protezione dell'ambiente marino*

ATENA
Accordi in atto o in via di finalizzazione

- ***Corpo del Genio della Marina***
- ***Comando Generale del Corpo delle Capitanerie di Porto***
- ***MIT: Direzione Trasporto Marittimo e acque interne***
- ***Ministero dell'Ambiente***
- ***I.I.S. De Pinedo - Colonna***
- ***Ministero dell'Istruzione Università e Ricerca***
- ***Dipartimento di Ingegneria dell'Università Roma 3***

Fattori di evoluzione delle Unità navali:

IMO – the International Maritime Organization – is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. IMO's work supports the UN SDGs.

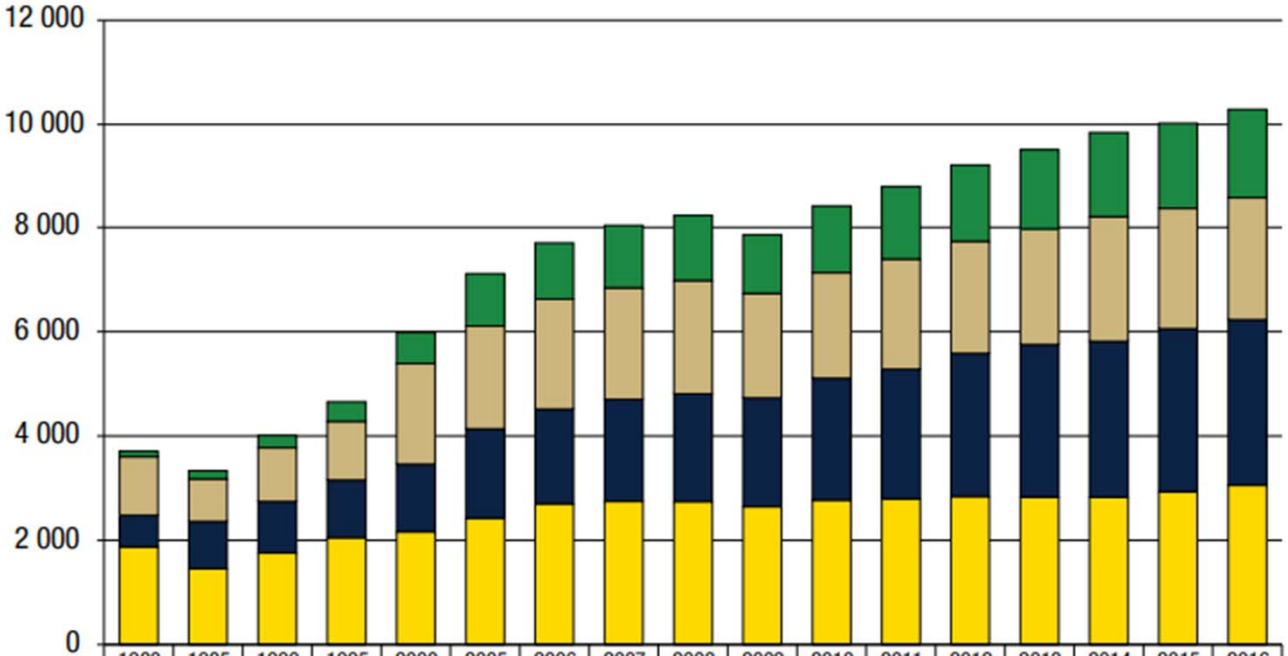
- *Rispetto delle Normative IMO:*

IMO measures cover all aspects of international shipping – including ship design, construction, equipment, manning, operation and disposal – to ensure that this vital sector for remains safe, environmentally sound, energy efficient and secure.

  - *Emissioni e impatto sull'ecosistema marino*
  - *Safety e Security*

- *Economicità di costruzione*
- *Economicità di gestione*
- *Economicità di dismissione*
- *Adeguamento a nuovi carichi paganti (equivalente all'ammodenamento del Sistema di Combattimento per le Unità militari)*
- *Peculiare del settore Cruise: introdurre sempre nuove attrazioni per catturare nuova clientela*

Figure 1.2. International seaborne trade, selected years (Millions of tons loaded)



	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Container	102	152	234	371	598	1 001	1 076	1 193	1 249	1 127	1 280	1 393	1 464	1 544	1 640	1 661	1 720
Other dry cargo	1 123	819	1 031	1 125	1 928	1 975	2 112	2 141	2 173	2 004	2 022	2 112	2 150	2 218	2 393	2 310	2 339
Five major bulks	608	900	988	1 105	1 295	1 711	1 814	1 953	2 065	2 085	2 335	2 486	2 742	2 923	2 985	3 121	3 172
Oil and gas	1 871	1 459	1 755	2 050	2 163	2 422	2 698	2 747	2 742	2 642	2 772	2 794	2 841	2 829	2 825	2 932	3 055

Sources: Review of Maritime Transport, various issues. For 2006–2016, the breakdown by cargo type is based on data from Clarksons Research, Shipping Review and Outlook and Seaborne Trade Monitor, various issues.

Enviromental Regulations

I M O

2013 **2015** **2016** **2020**

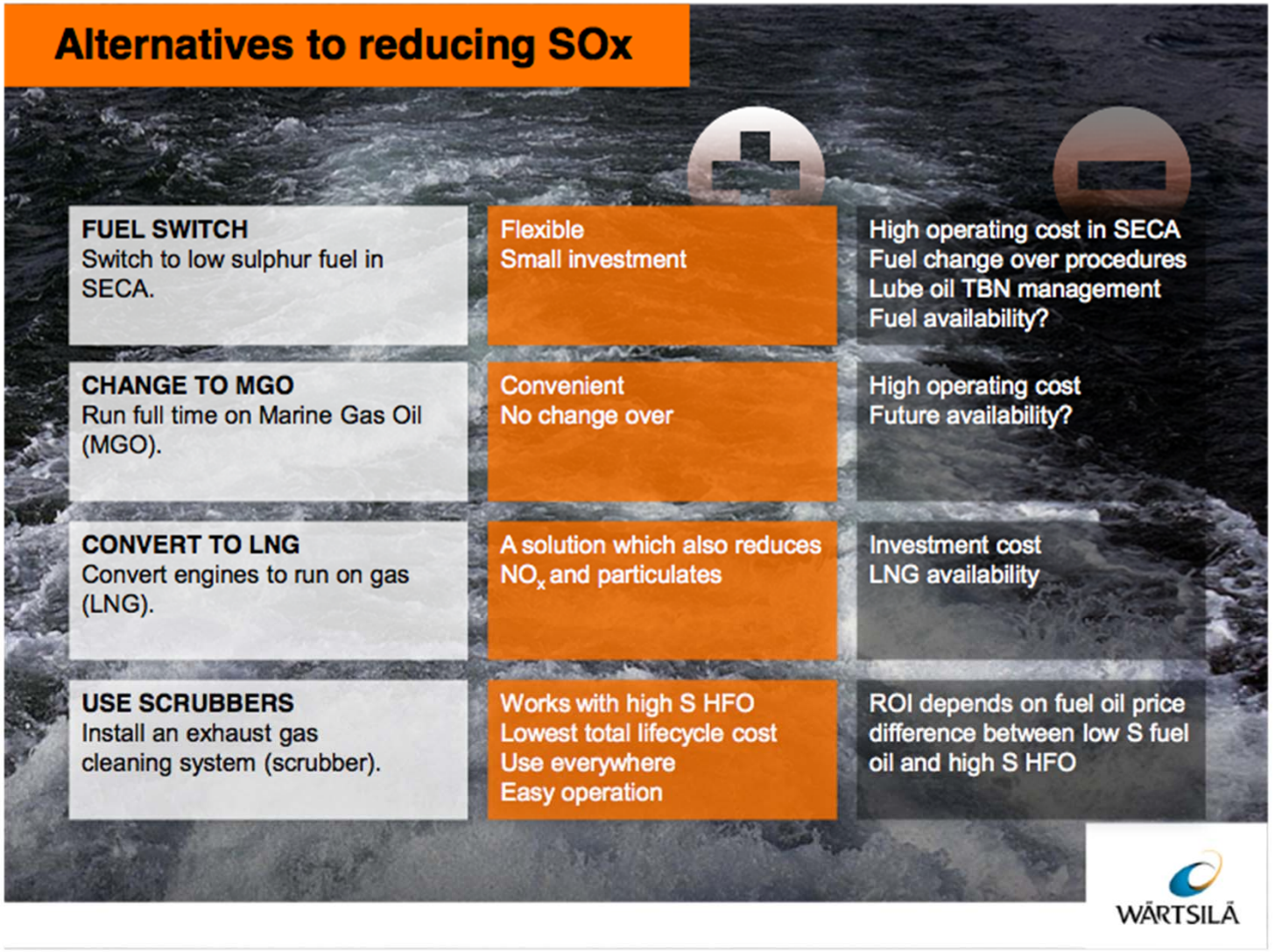
0.10% ECA sulphur limit

Nox TIER III for newbuildings ECS operations

0.50% global sulphur limit

IMO

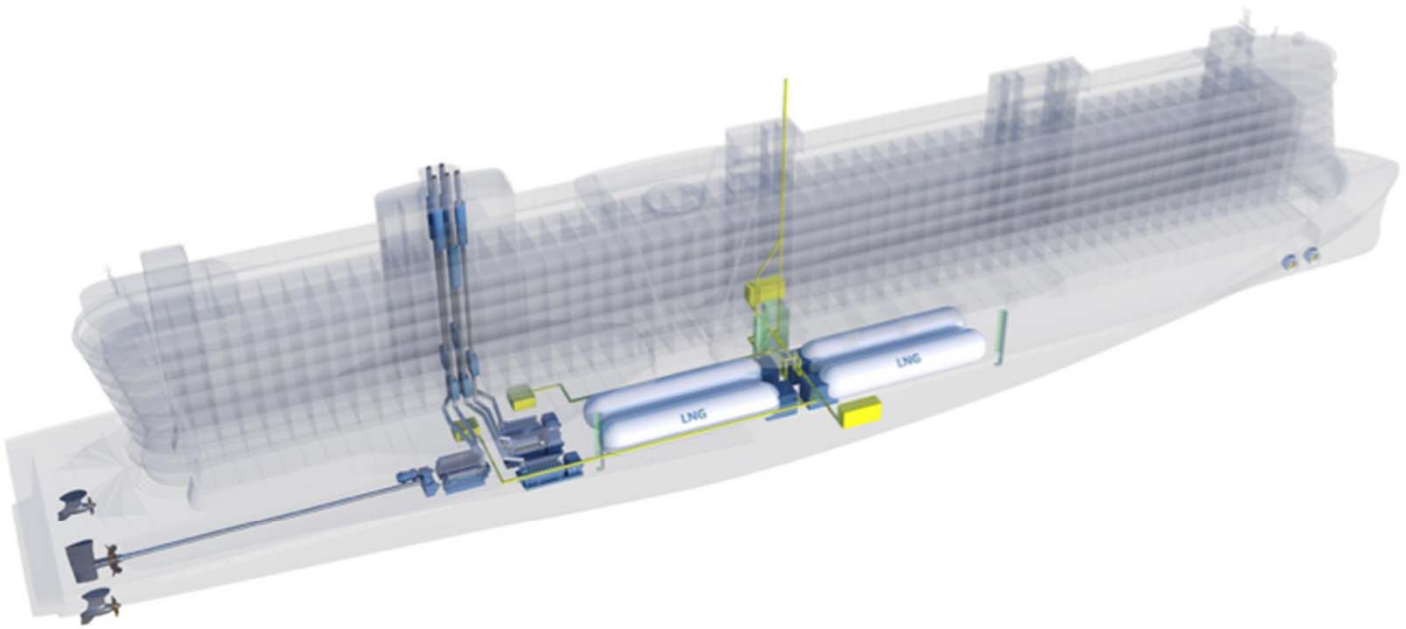
Impianti di de-solforazione dei fumi
Scrubber



Fonte: Presentazione Wartsila - Hamworthy, agosto 2012

Liquified Natural Gas - LNG

Sapphire Blue – LNG installation



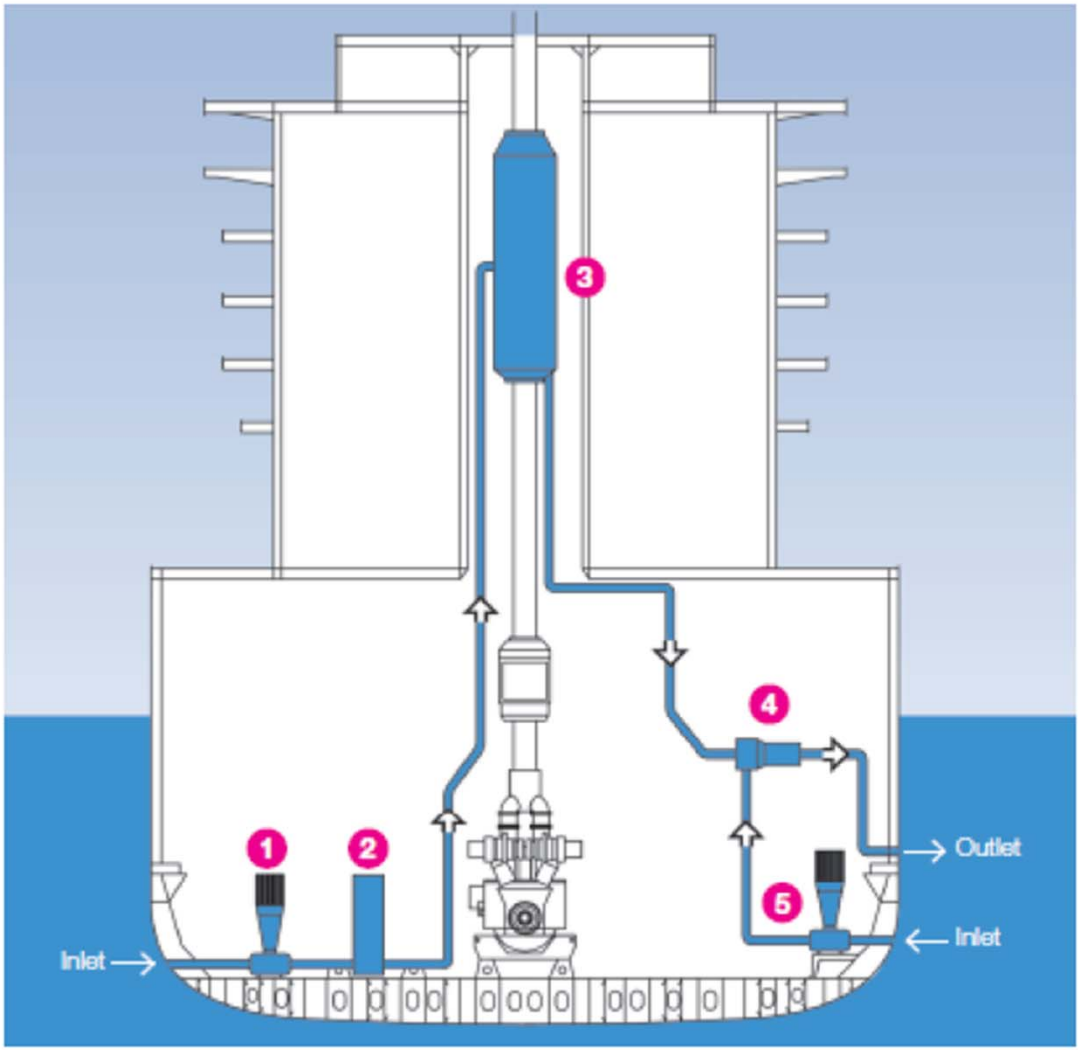
Rolls-Royce

 Finn Arne Rognstad

Fonte: Presentazione fatta al "Naples Shipping Week", giugno 2014

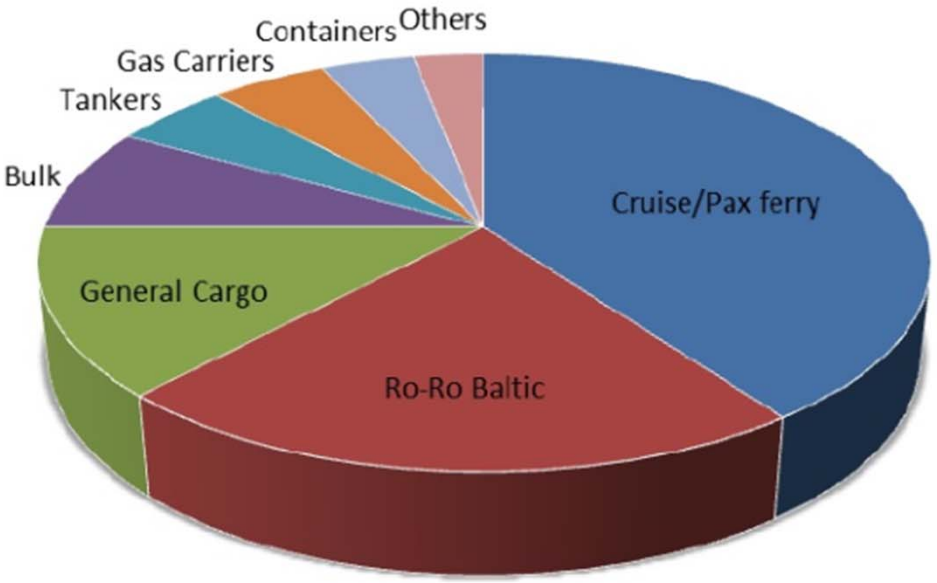
Open Loop EGCS: Main Systems Components

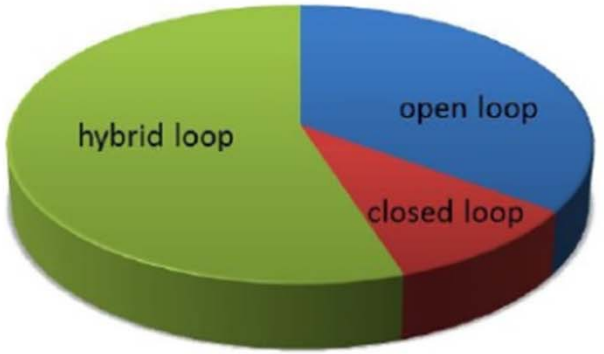
IMO

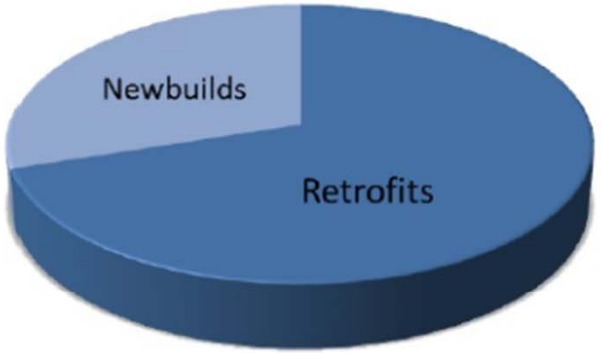


1. SW Pump & VFD
2. SW Filter
3. DeSOx Tower
4. Static Mixer
5. Dilution Pump & VFD

About 200 confirmed projects for scrubbers (cumulative)







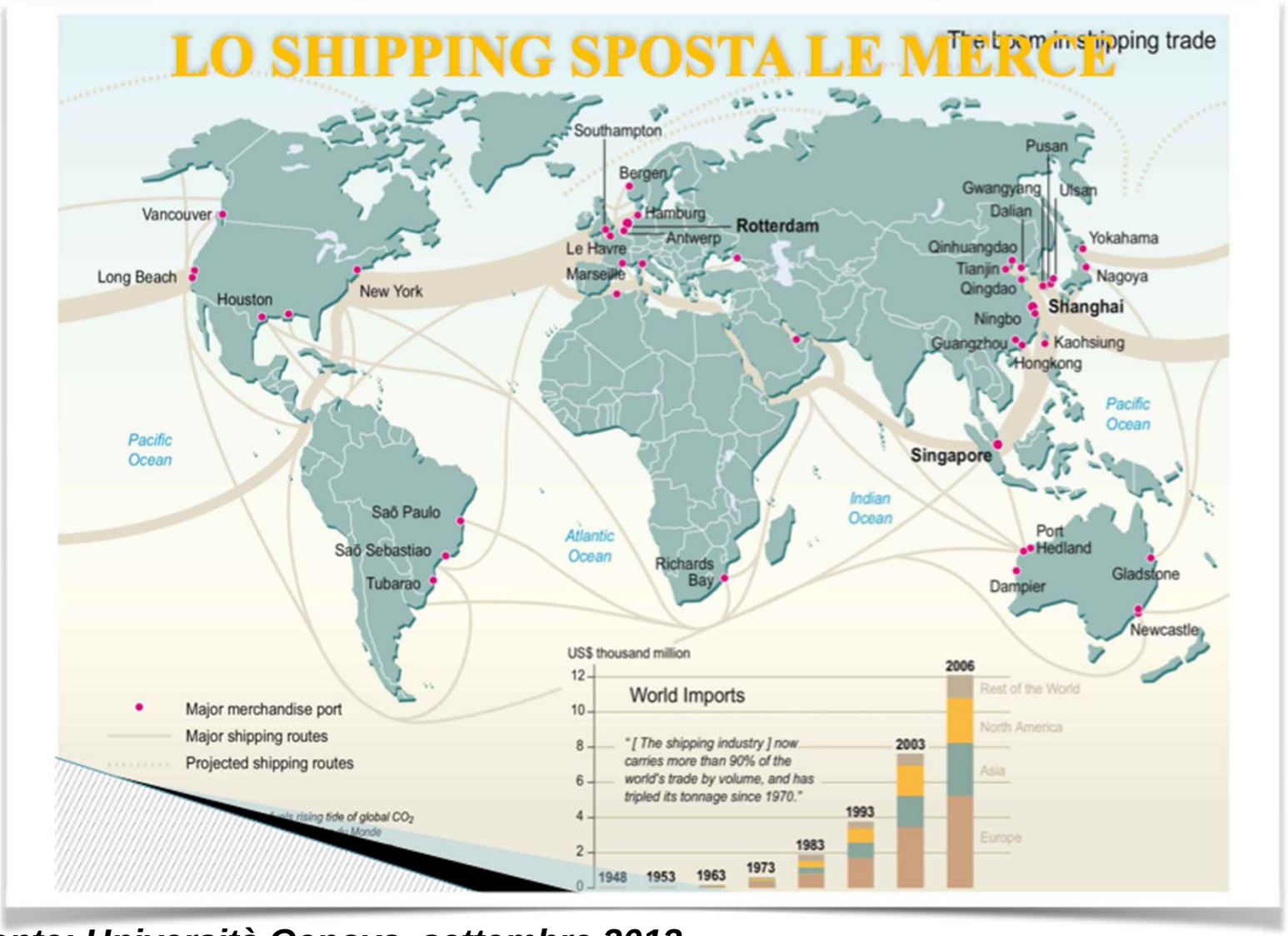
- **Open loop, single stream very popular for Cruise ships**
- **Hybrid loop, multi stream popular for Baltic Ferries**

DuPont
Sustainable Solutions
CLEAN TECHNOLOGIES

BELCO®

IMO

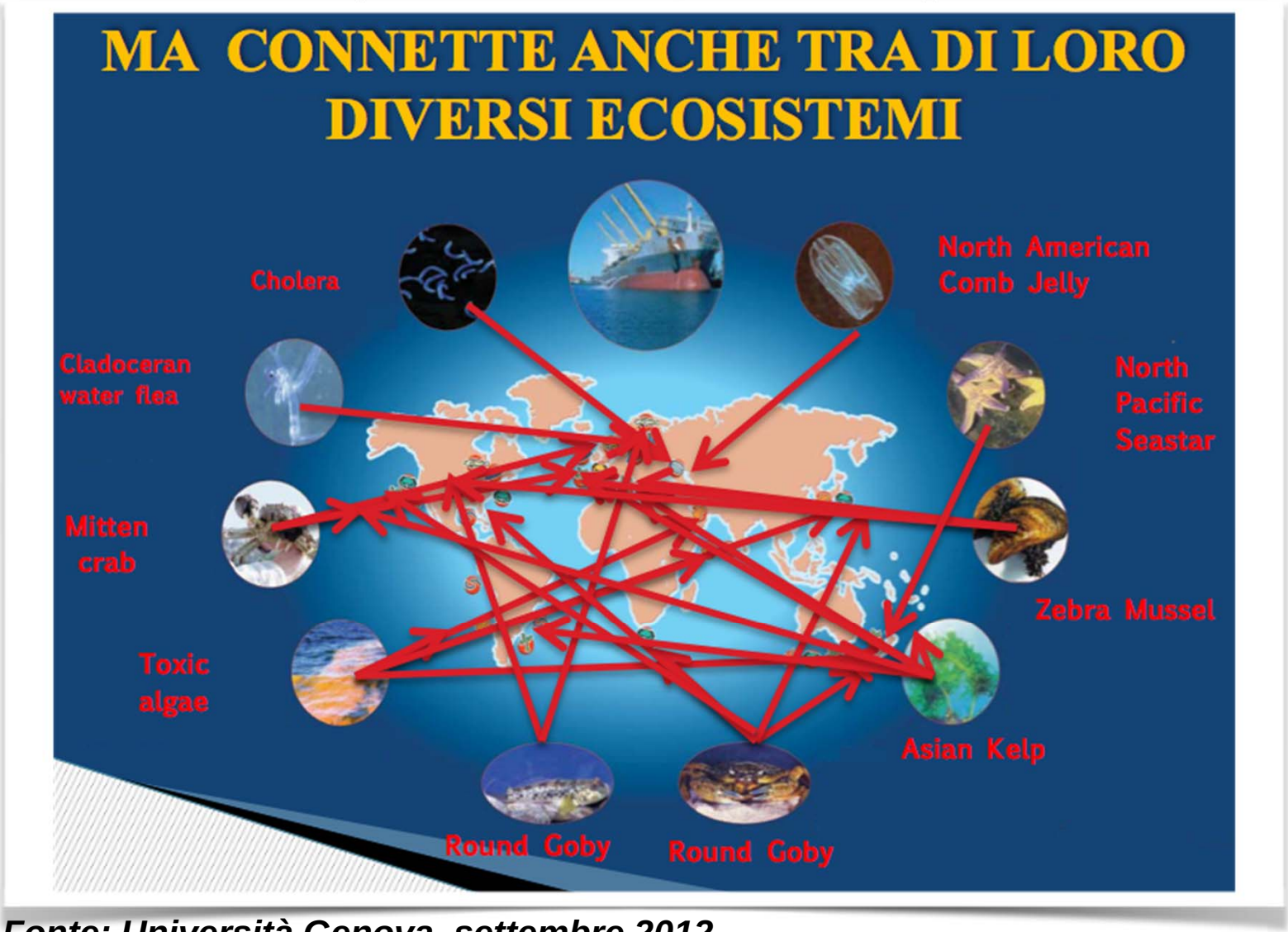
Acqua di zavorra (Ballast Water - BW)



Fonte: Università Genova, settembre 2012

IMO

Acqua di zavorra
(Ballast Water - BW)



Fonte: Università Genova, settembre 2012

IMO

Acqua di zavorra - IMO

➢ IMO BWM Convention del 2004

➢• Entrerà in vigore quando i due criteri seguenti saranno soddisfatti:

- 30 stati
- 35% della portata lorda mondiale

2 OPZIONI:

1° Opzione: (Interim)	2° Opzione: (lungo termine)
Cambiare l'acqua di zavorra (REGULATION D1)	Trattare l'acqua di zavorra (REGULATION D2)

Fire Detection System

Safety

Main characteristics:

- ✓ Addressable system
- ✓ SRtP Compliant
- ✓ Complete range of detectors
- ✓ Possible extension to external elements (Fire Doors, Hi-Fog)
- ✓ Colour Graphic User Interface on Central Units
- ✓ Full integration with SMCS
- ✓ Complete HW and SW internal development (MD2 & ASIC).

May 2014

10

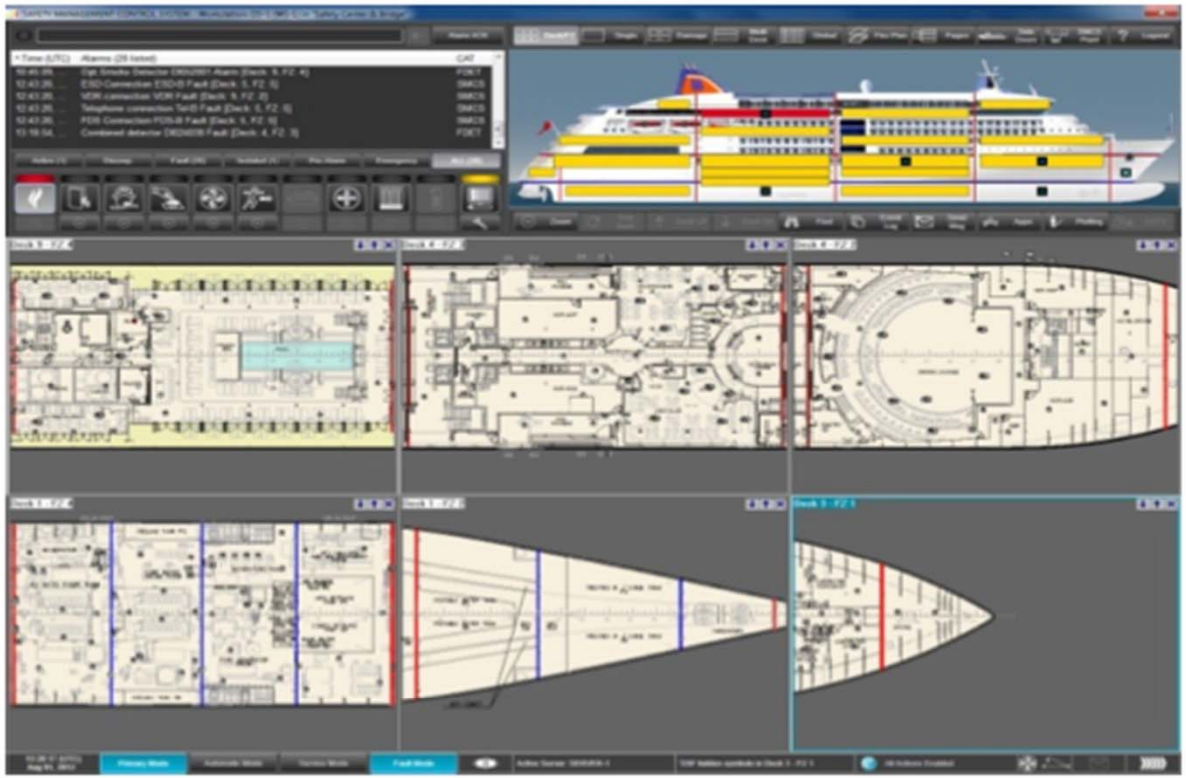
Fonte: Ditta MARTEC

Safety Monitoring and Control System

Safety

GAP Views

- Deck/FZ view
- Single view
- Damage View
- Multi-Deck View
- Global View



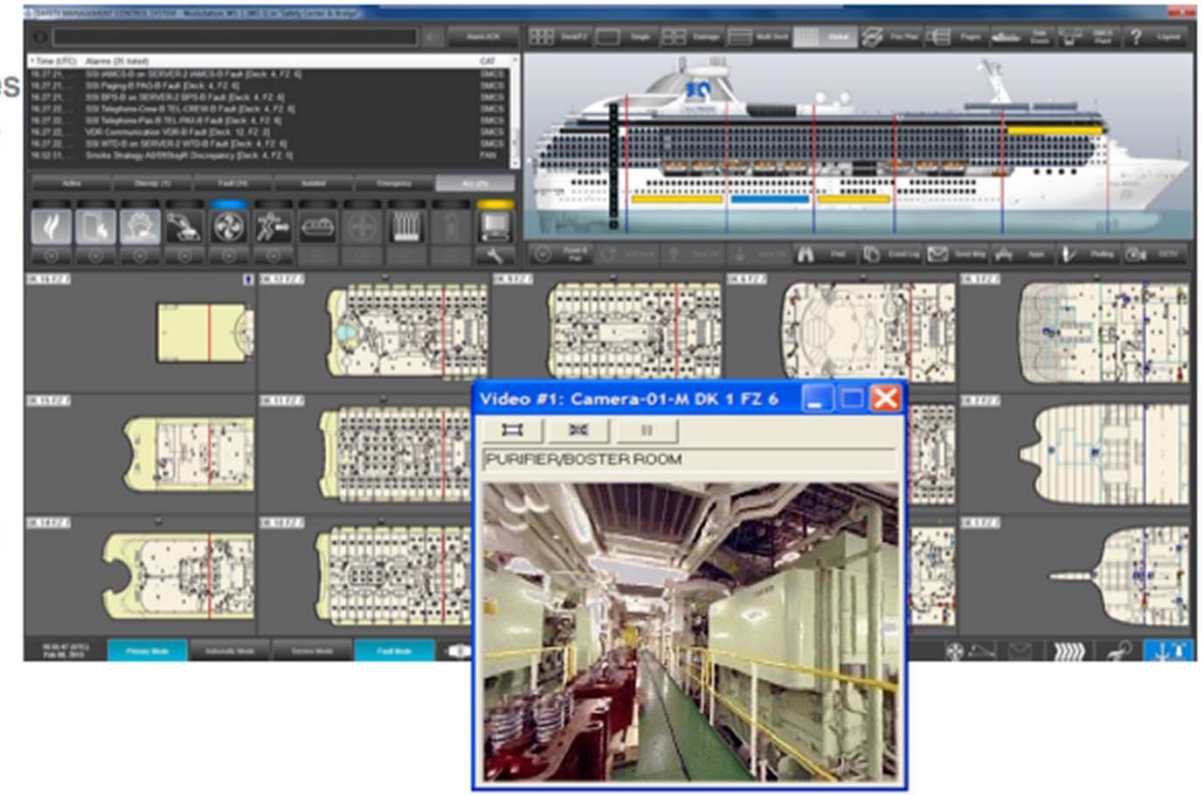
Fonte: Ditta MARTEC

Safety

Safety Monitoring and Control System

CCTV Images

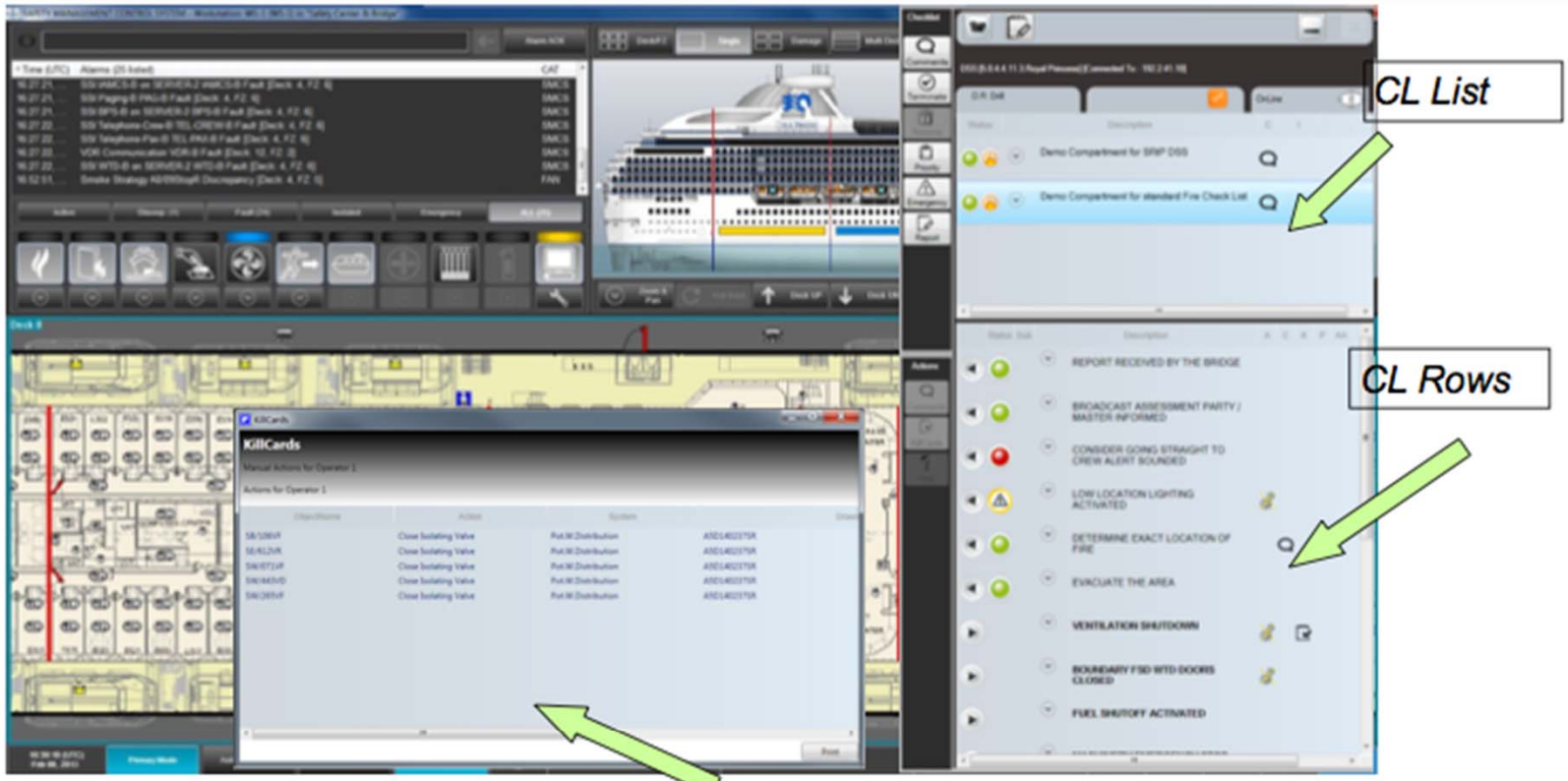
- Acquisition of images from Video matrixes
- Digitalization and distribution to workstations
- Direct acquisition from DVR and IP cameras
- Link to fire alarms
- Possibility to control camera



Fonte: Ditta MARTEC

Safety

Decision Support System



May 2014

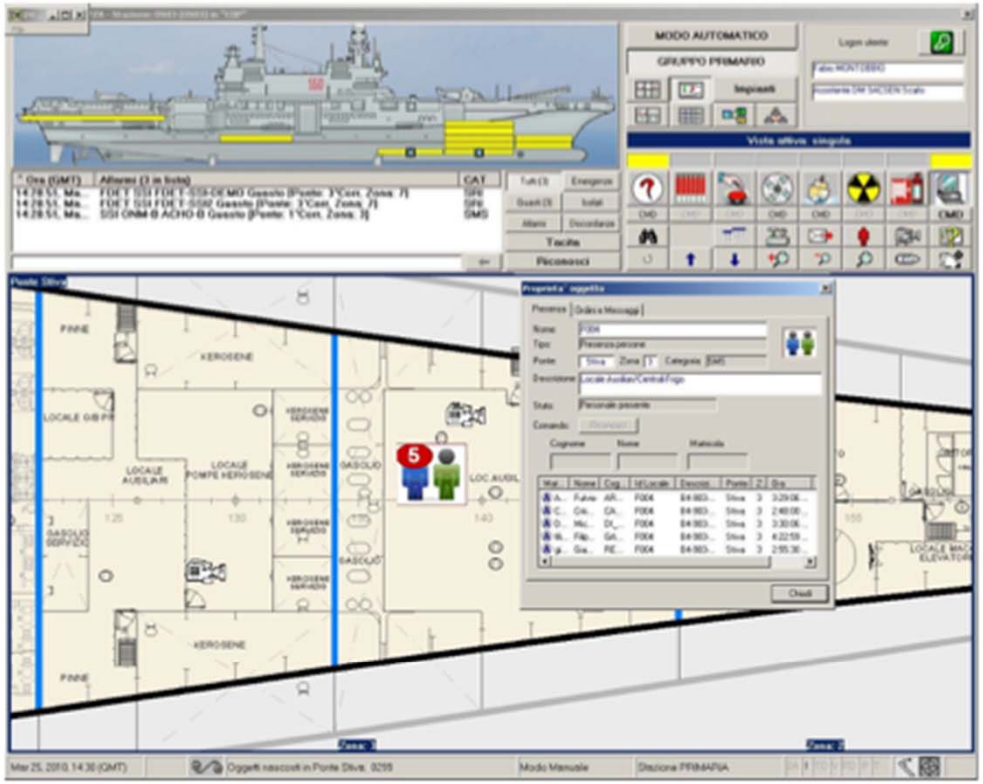
66

Fonte: Ditta MARTEC

People Tracking System

Information displayed on SMCS for CO2 room monitoring

1. One Icon in monitored Room showing how many people are detected in the room
2. Icon properties show the list of detected people
3. Following alarms can be shown through SMCS:
    1. Not working reader
    2. Not working antenna
    3. Tag battery is going out of charge
    4. Unregistered TAG detected



Fonte: Ditta MARTEC

Progettazione

Direttive IMO

(MEPC: Maritime Environmental Protection Committee)

Nel Luglio 2011, e nel corso della riunione MEPC 62, i paesi hanno concordato di adottare emendamenti al MARPOL Annex VI, che prevedono l'implementazione di:

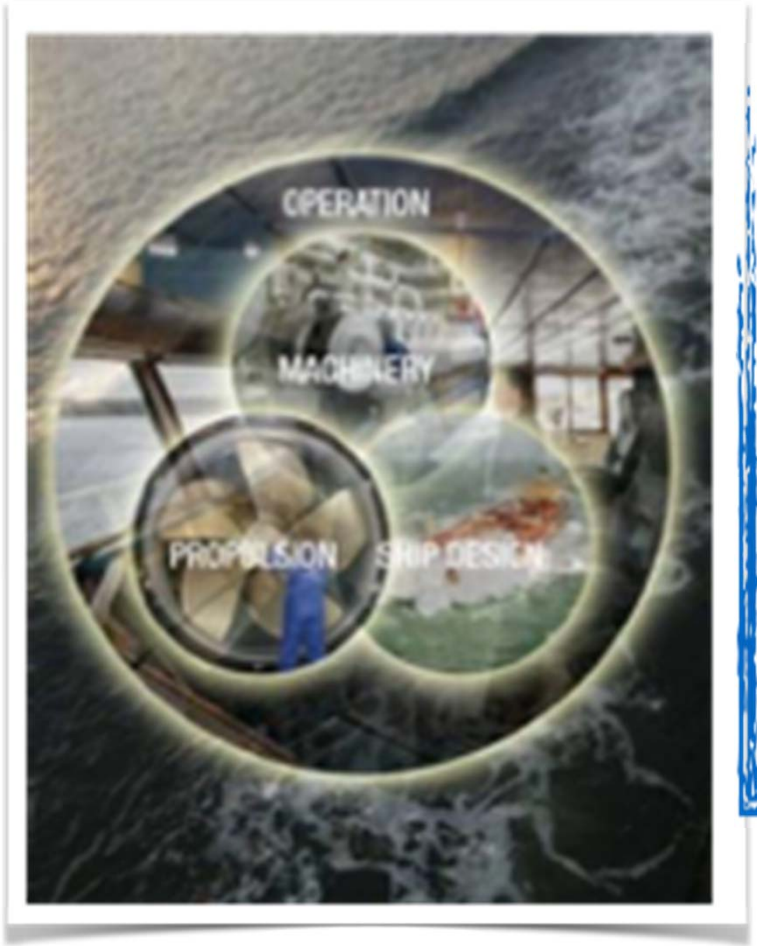
A. ***Energy Efficiency Design Index (EEDI)***, obbligatorio per le nuove navi

B. ***Ship Energy Efficiency Management Plan (SEEMP),*** per tutte le navi

Si tratta del primo accordo di valore legale tra i paesi dopo il "Protocollo di Kyoto", firmato tra 180 paesi l'11 dicembre 1997.

Progettazione

Progettare una nave più efficiente



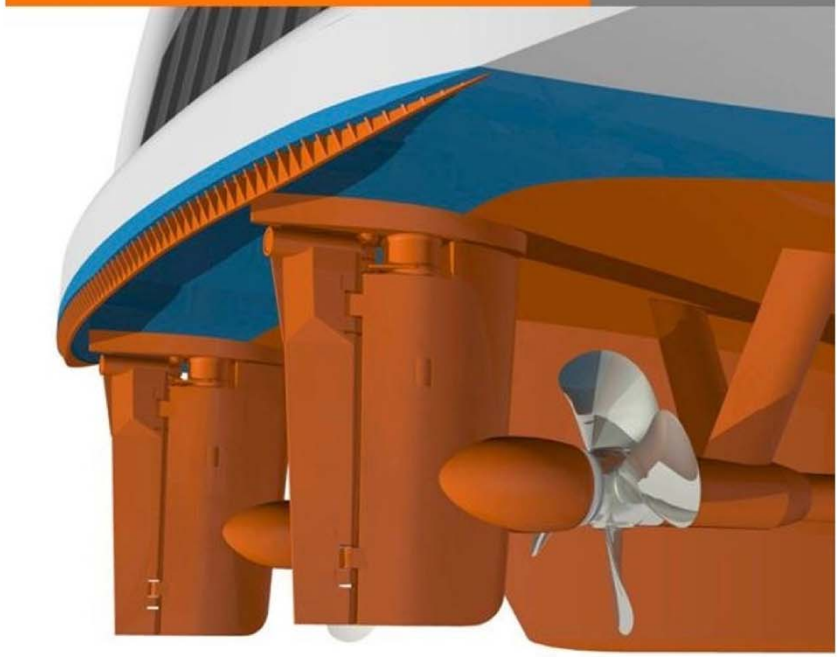
Aspetti da considerare:

1. Idrodinamica, layout e strutture
2. Propulsione
3. Apparecchiature
4. Gestione e manutenzione

Fonte, presentazione **Wartsila:** ***"How to design a more efficient ship"***

Idrodinamica

Interceptor trim planes < 4%



The Interceptor is a metal plate that is fitted vertically to the transom of a ship, covering most of the breadth of the transom. This plate bends the flow over the aft-body of the ship downwards, creating a similar lift effect as a conventional trim wedge due to the high pressure area behind the propellers. The interceptor has proved to be more effective than a conventional trim wedge in some cases, but so far it has been used only in cruise vessels and RoRos. An interceptor is cheaper to retrofit than a trim wedge.

1-5% lower propulsion power demand. Corresponding improvement of up to 4% in total energy demand for a typical ferry.

Ducktail waterline extension < 7%

A ducktail is basically a lengthening of the aft ship. It is usually 3-6 meter long. The basic idea is to lengthen the effective waterline and make the wetted transom smaller. This has a positive effect on the resistance of the ship. In some cases the best results are achieved when a ducktail is used together with an interceptor.

4-10% lower propulsion power demand. Corresponding improvement of 3-7% in total energy consumption for a typical ferry.

Fonte: documento Wartsila

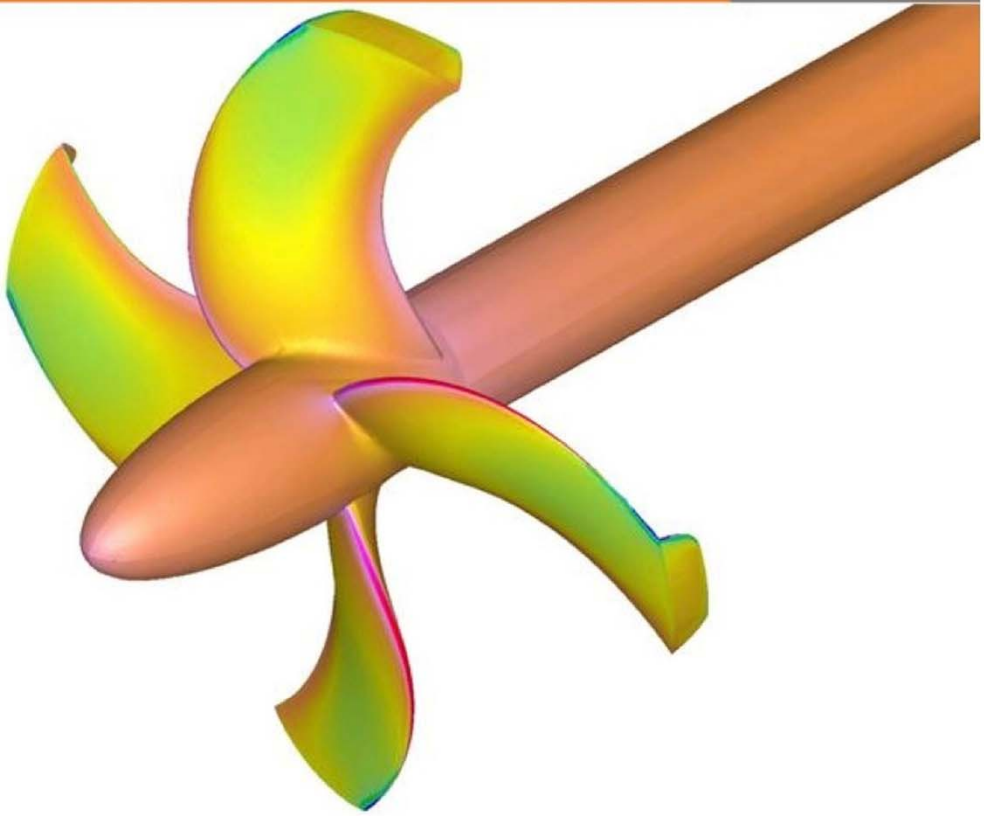
Idrodinamica

CRP propulsion **< 12%**

Counter rotating propellers consist of a pair of propellers behind each other that rotate in opposite directions. The aft propeller recovers some of the rotational energy in the slipstream from the forward propeller. The propeller couple also gives lower propeller loading than for a single propeller resulting in better efficiency.

Fonte: documento Wartsila

Propeller tip winglets < 4%



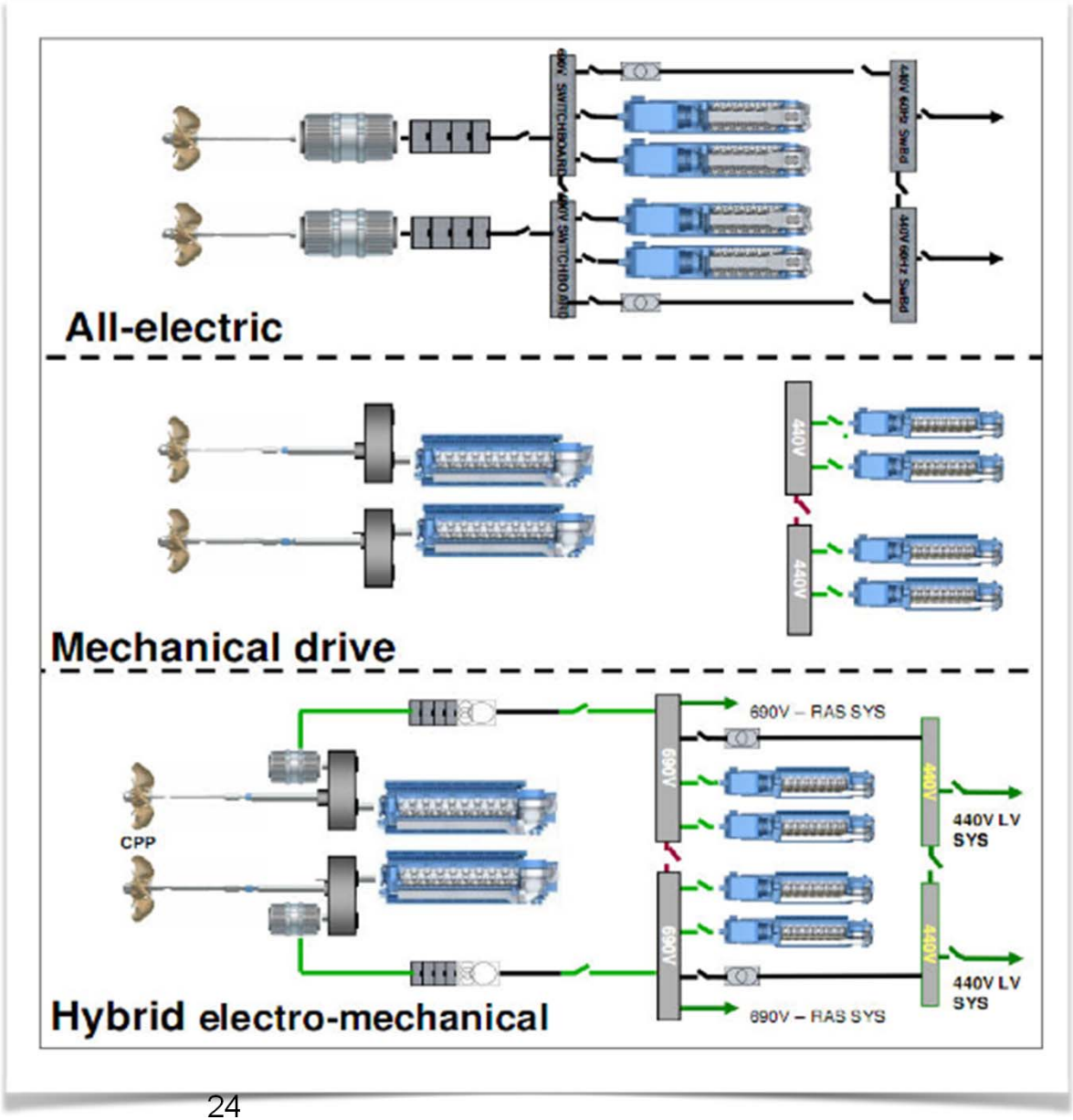
Winglets are known from the aircraft industry. The design of special tip shapes can now be based on computational fluid dynamic calculations which will improve propeller efficiency.

Improved propeller efficiency of up to 4%.

Fonte: documento Wartsila

Propulsione ibrida e *full electric*

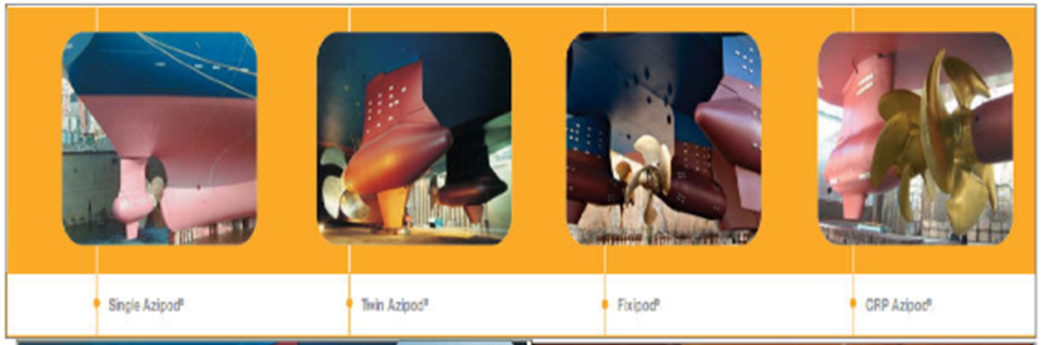
- La propulsione full electric ha solo motori generatori
- Entrambi le soluzioni garantiscono un notevole vantaggio rispetto alla propulsione meccanica in termini di flessibilità d'impiego

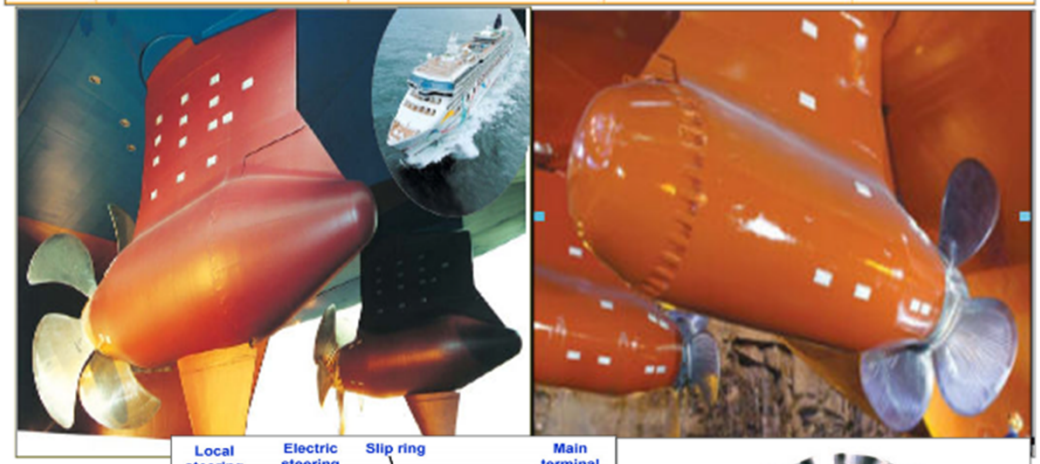


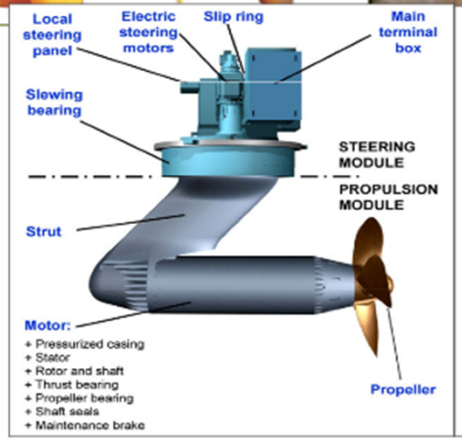
Propulsione ibrida e *full electric - POD*

Maggiore efficienza idrodinamica per:

- minore resistenza di carena
- maggiore efficienza propulsiva per il flusso “meno disturbato”



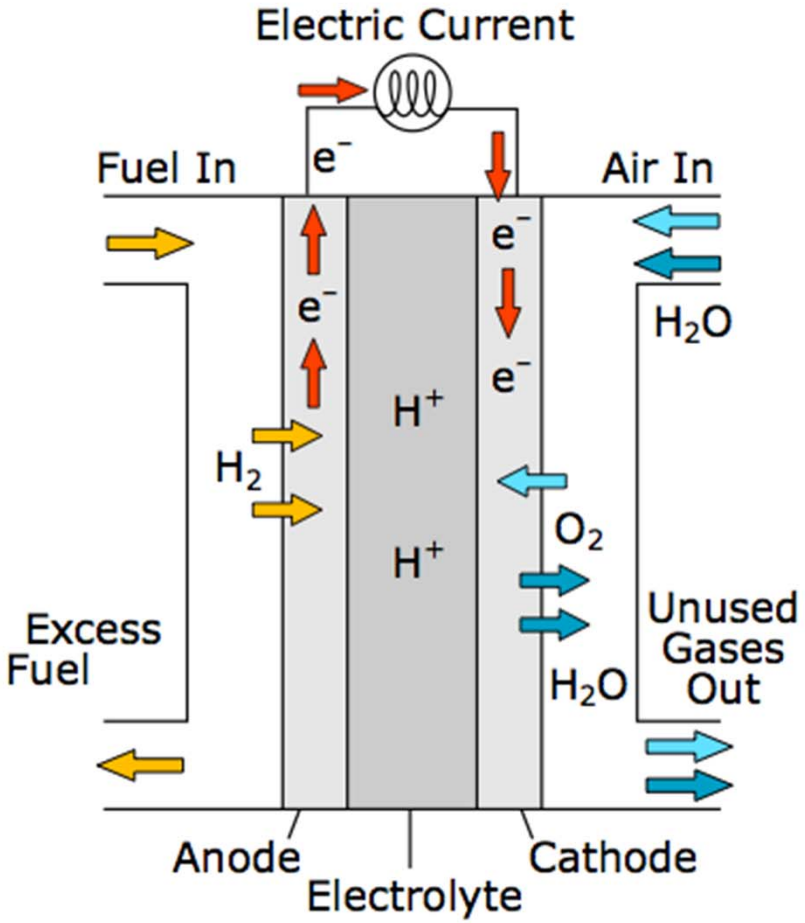




Apparato motore

Fuel cells

Schema di funzionamento

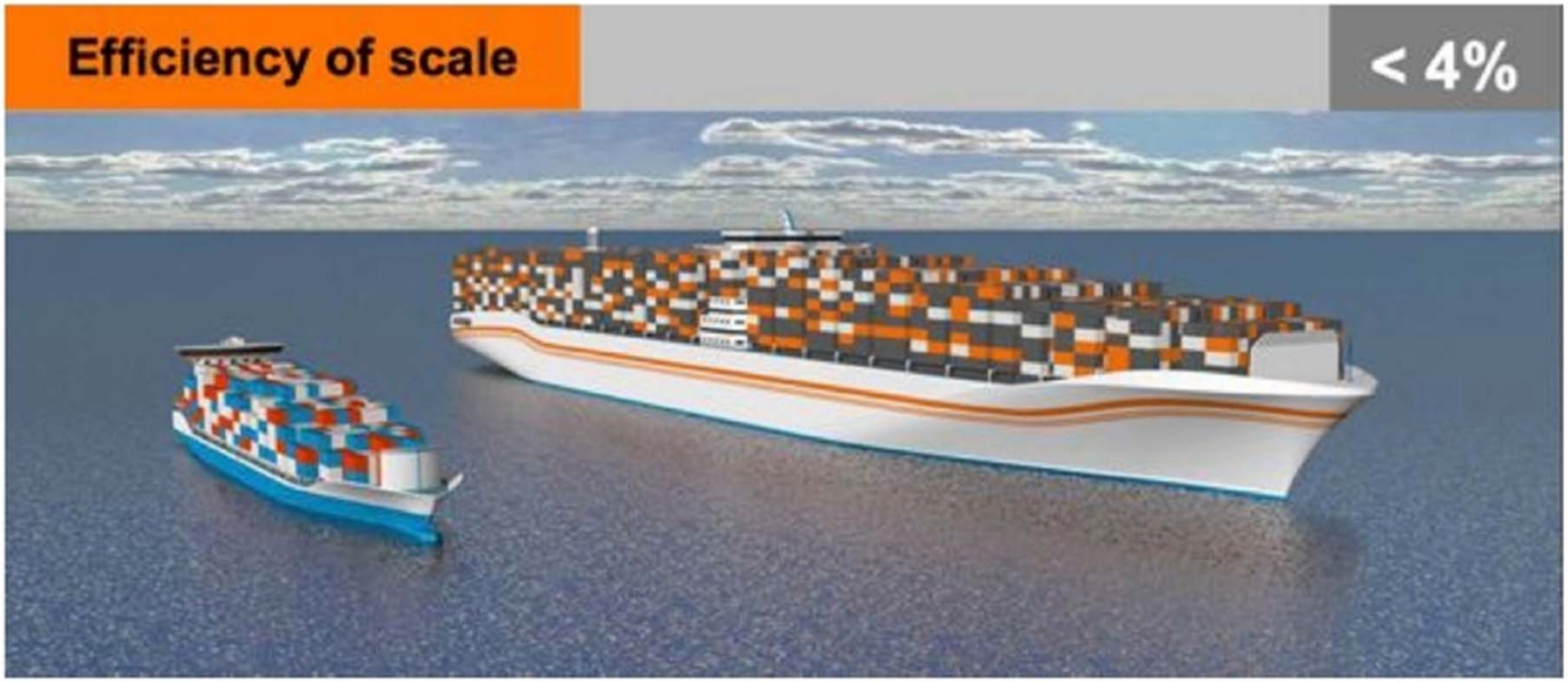


Apparato motore

Fuel cells

U212: è il più moderno sommergibile della MMI, costruito da Fincantieri in collaborazione con HDW (Germania)

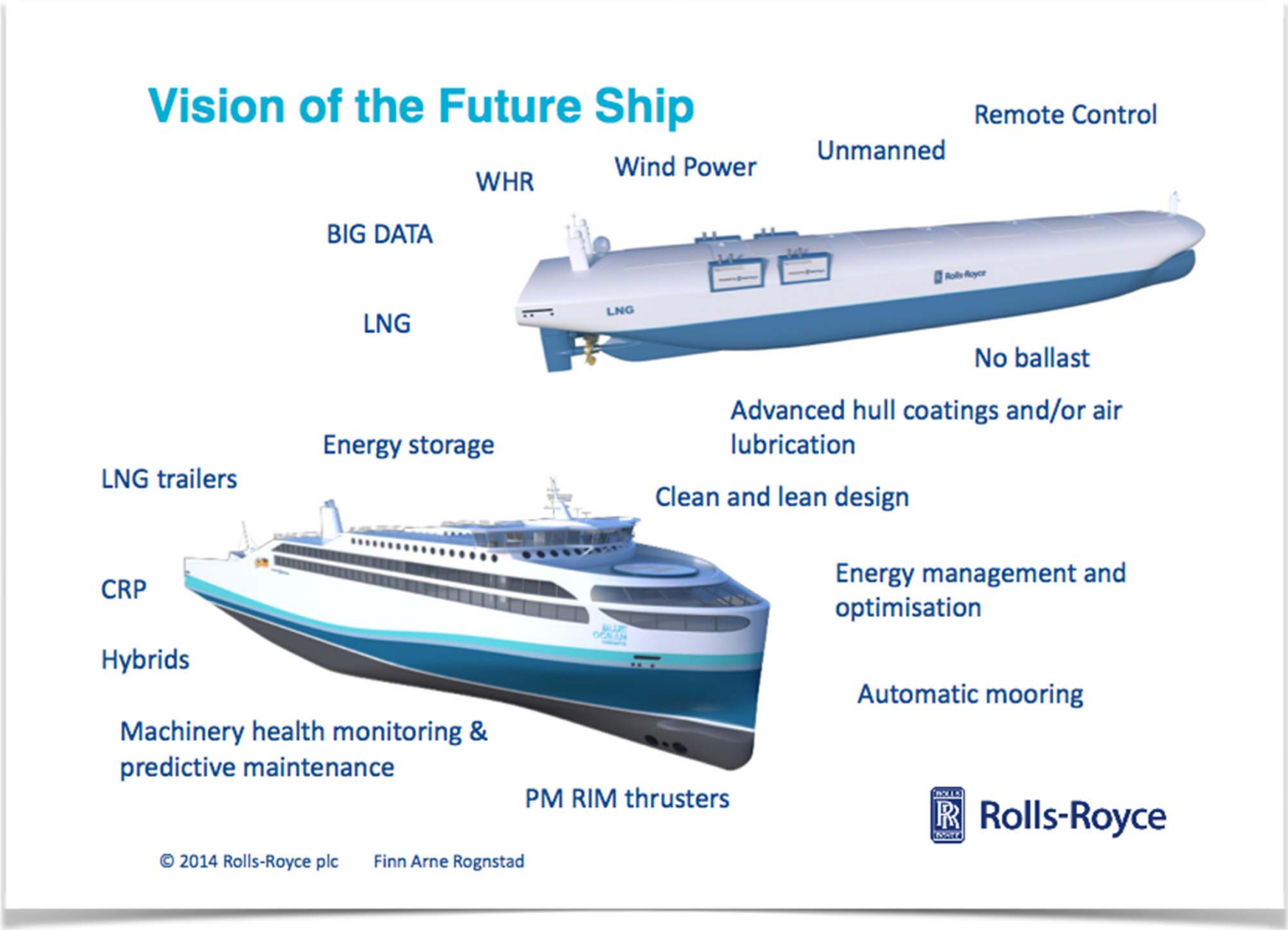
Dimensioni



A larger ship will in most cases offer greater transport efficiency – "Efficiency of Scale" effect. A larger ship can transport more cargo at the same speed with less power per cargo unit. Limitations may be met in port handling.

Regression analysis of recently built ships show that a 10% larger ship will give about 4-5% higher transport efficiency.

Fonte: documento Wartsila



Fonte: Presentazione fatta al"Naples Shipping Week", giugno 2014

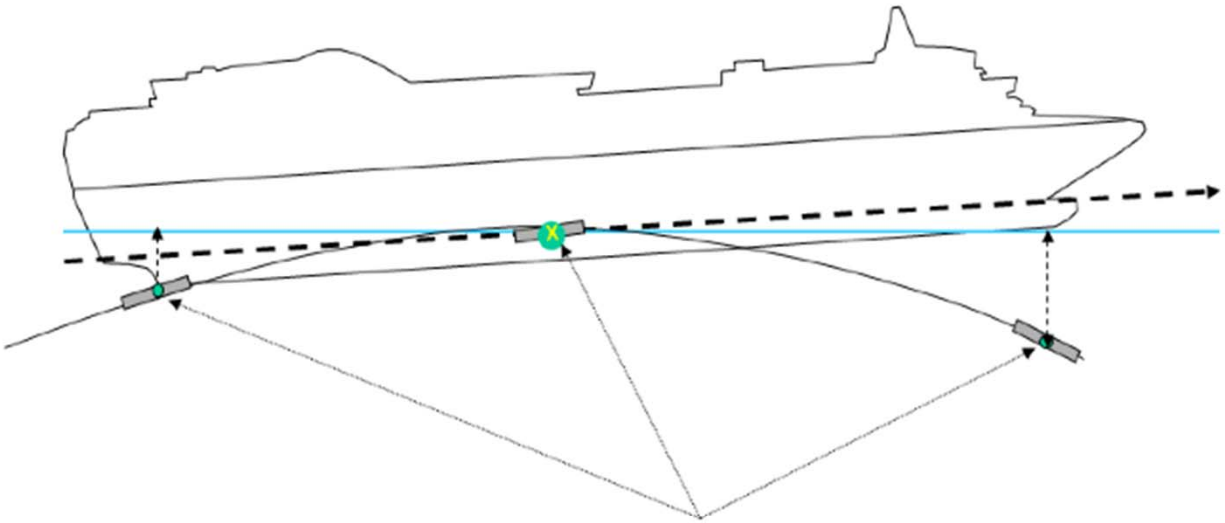
Gestione

Controllo e ottimizzazione assetto (TRIM)

CETENA S.p.A. CENTRO PER GLI STUDI DI TECNICA NAVALE

Confitarma – 04 dec 2012

AD HOC SENSORS:



- N°3 high precision inclinometer are installed to accurately measure dynamic trim
- Inclinometers are calibrated on board through drought marks reading

a FINCANTIERI COMPANY

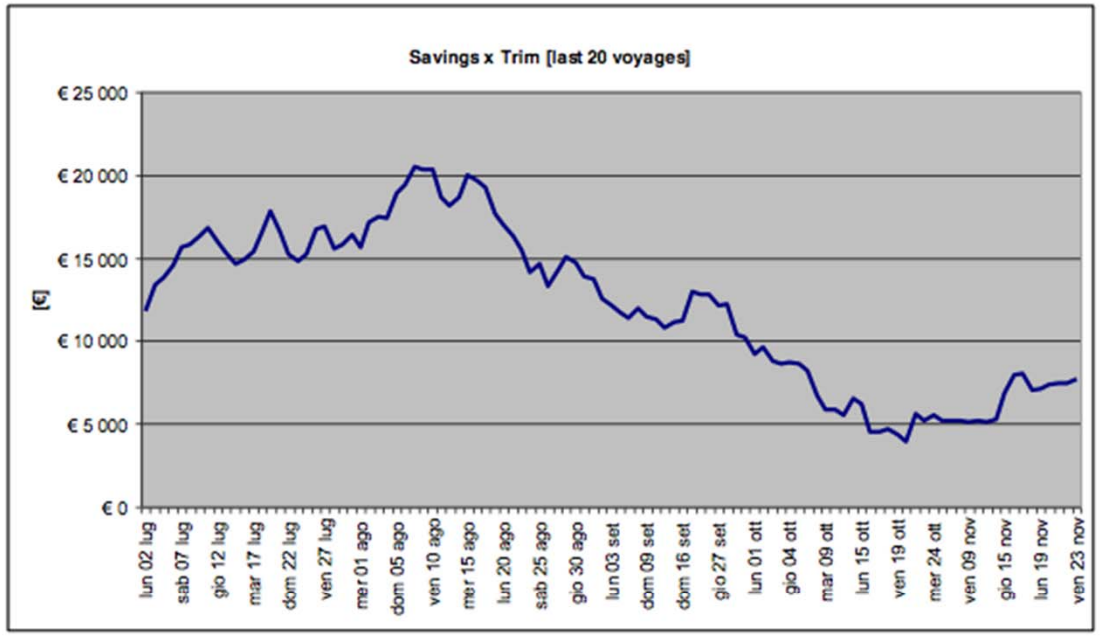
Fonte: Presentazione CETENA a Confitarma, 4.12.2012

Gestione

Controllo e ottimizzazione assetto (TRIM)

CETENA
CENTRO PER GLI STUDI DI TECNICA NAVALE

Confitarma – 04 dec 2012



Possible savings for groups of 20 voyages.

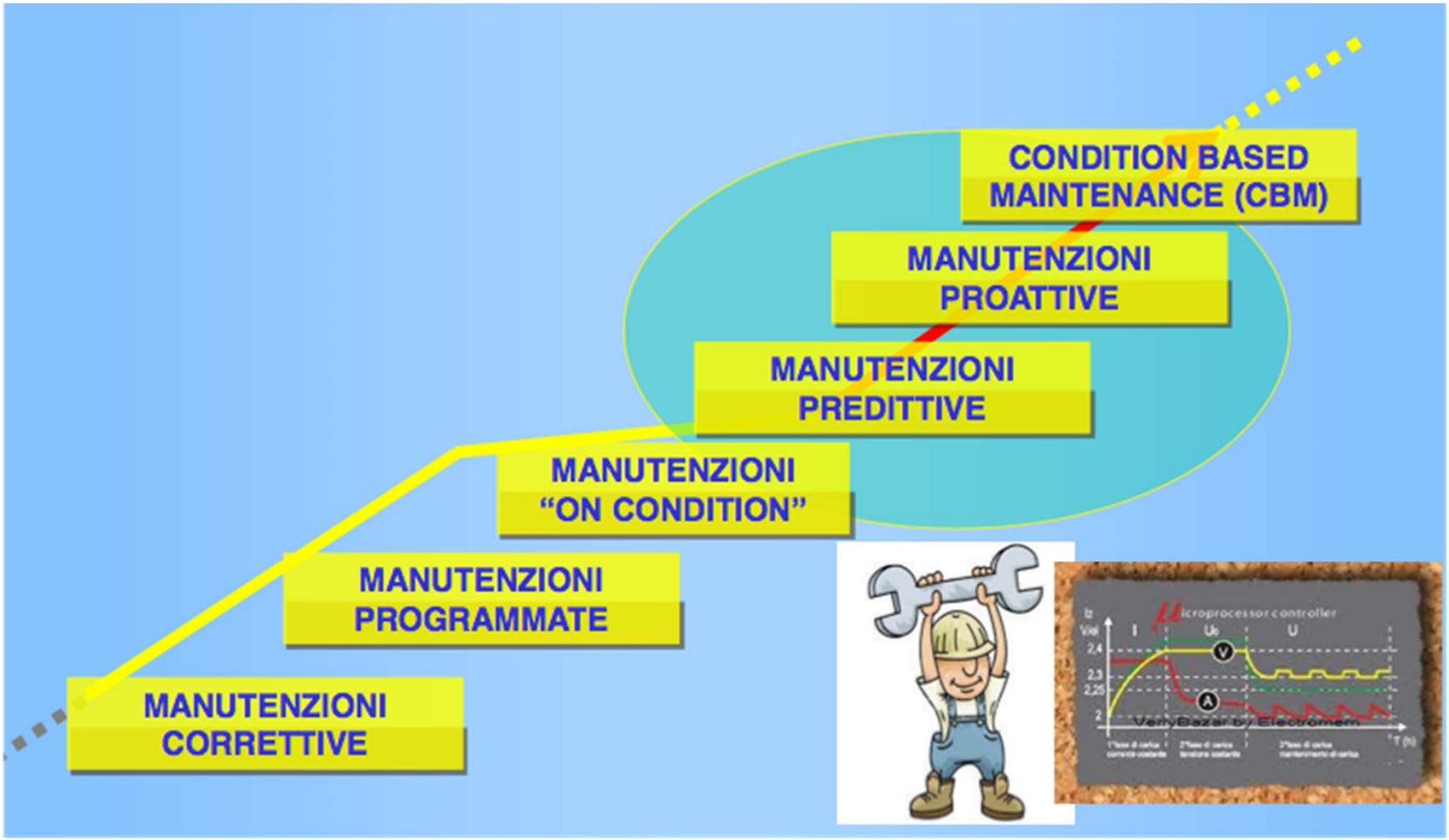
Possible savings are reduced as time goes on due to the fact that the ship started adopting optimum trim strategy. If the trend continues, results on bunker delivery notes are expected.

a FINCANTIERI COMPANY

Fonte: Presentazione CETENA a Confitarma, 4.12.2012

Gestione

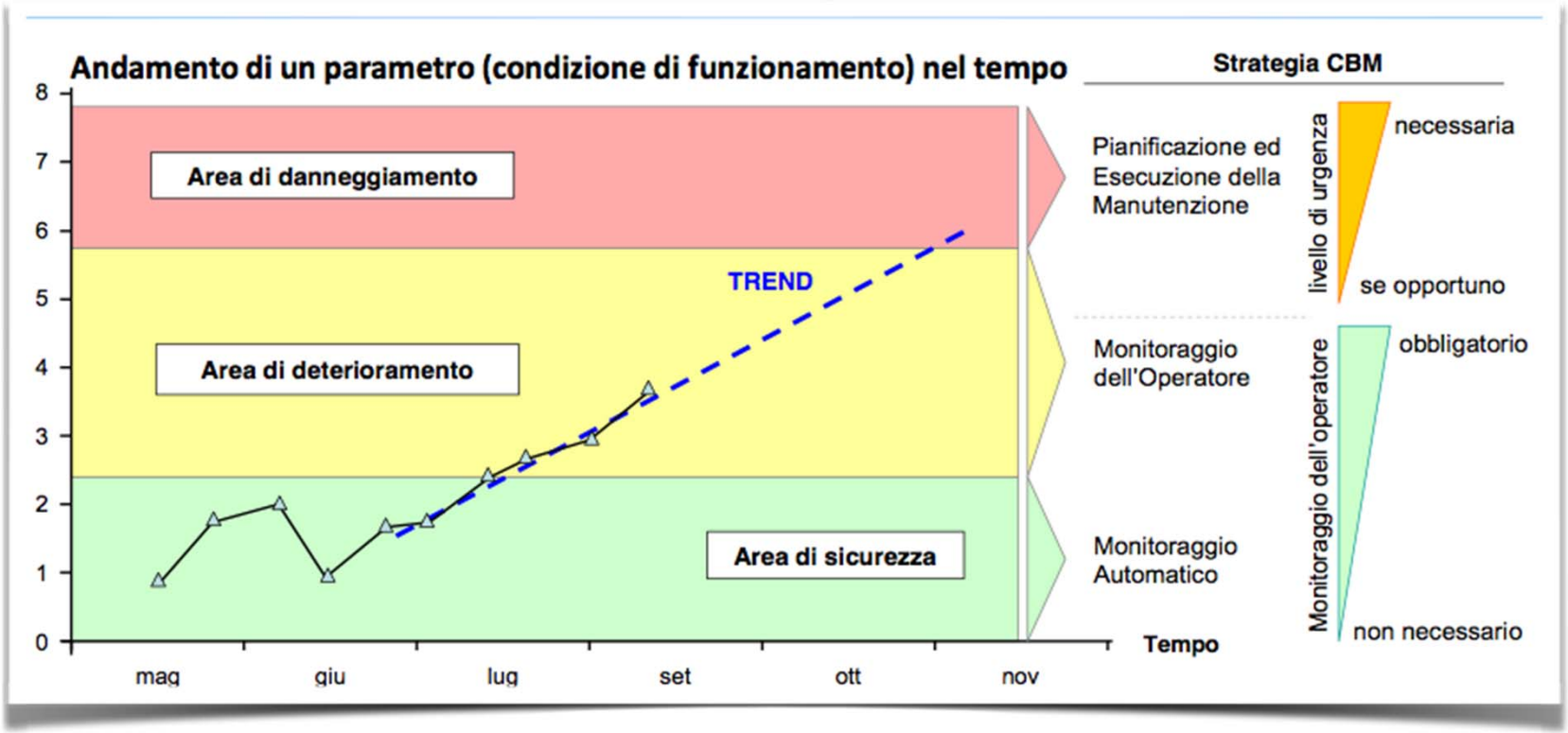
Evoluzione dei criteri di manutenzione verso il CBM



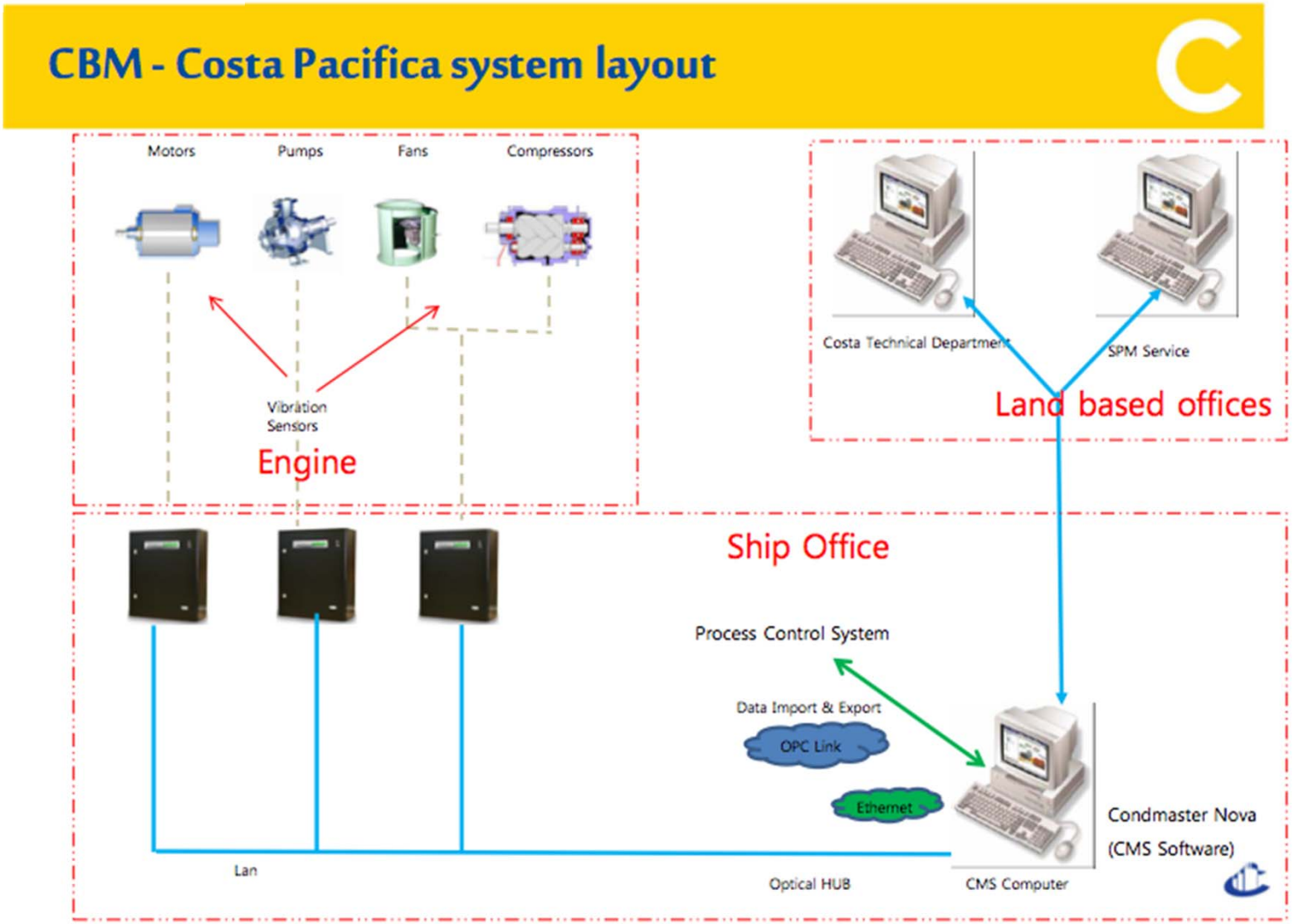
Gestione

Algoritmi del CBM

- Individuazione dei campi di funzionamento riferiti ad un certo parametro (o ad una certa condizione)
- Posizionamento dei dati del parametro (o della condizione) rispetto ai campi di funzionamento



Gestione



Fonte: Presentazione della Costa Crociere a La Spezia, il 14 maggio 2014

ATENA
ASSOCIAZIONE ITALIANA
DI TECNICA NAVALE

Refitting

DESIGN CONSIDERATIONS

ON BULK CARRIERS INTO CEMENT CARRIERS CONVERSION

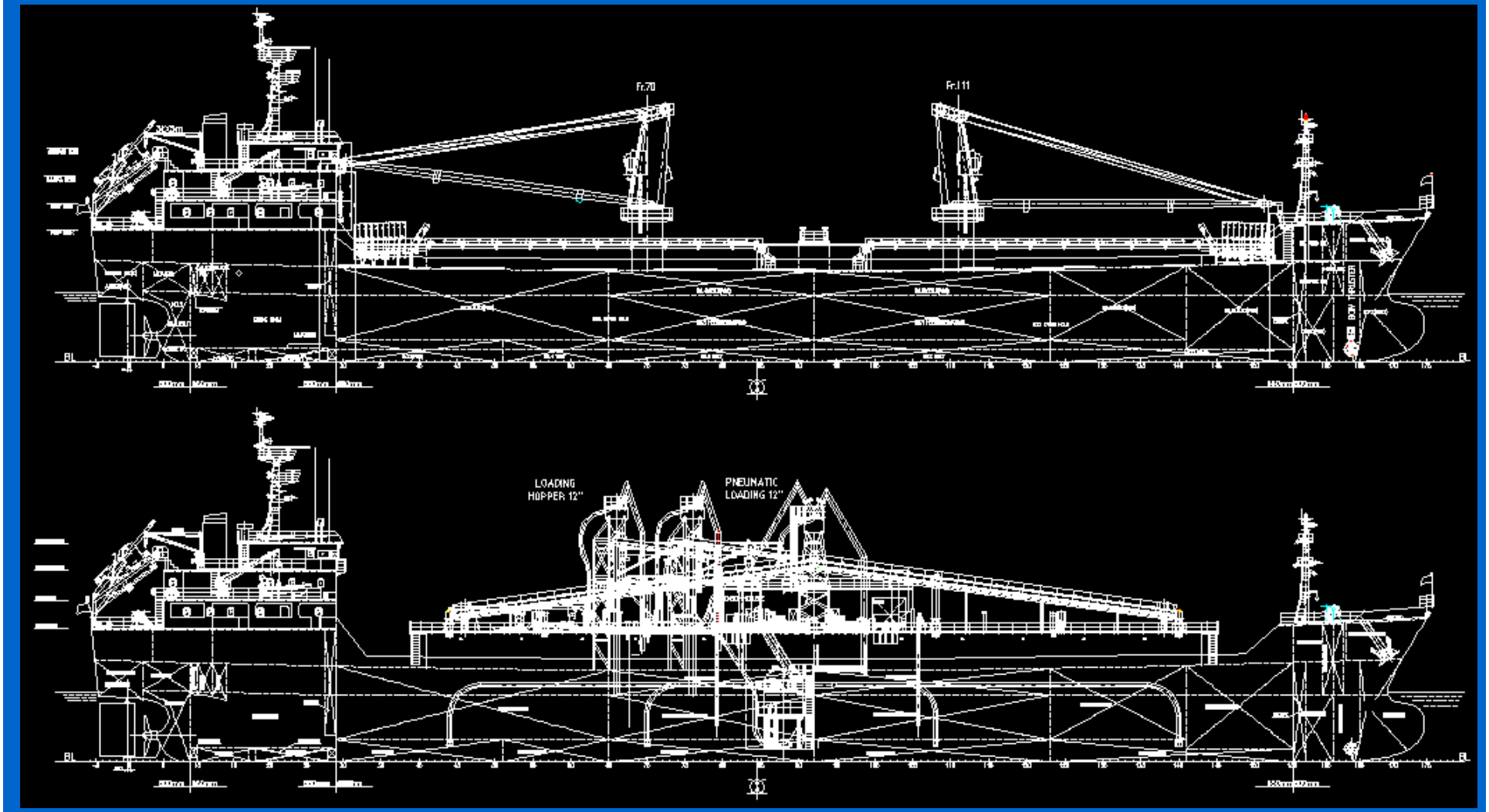
Ing. Alberto Moroso

Studio Tecnico Navale "Moroso – Starita"

ATENA Roma, 17/10/2017

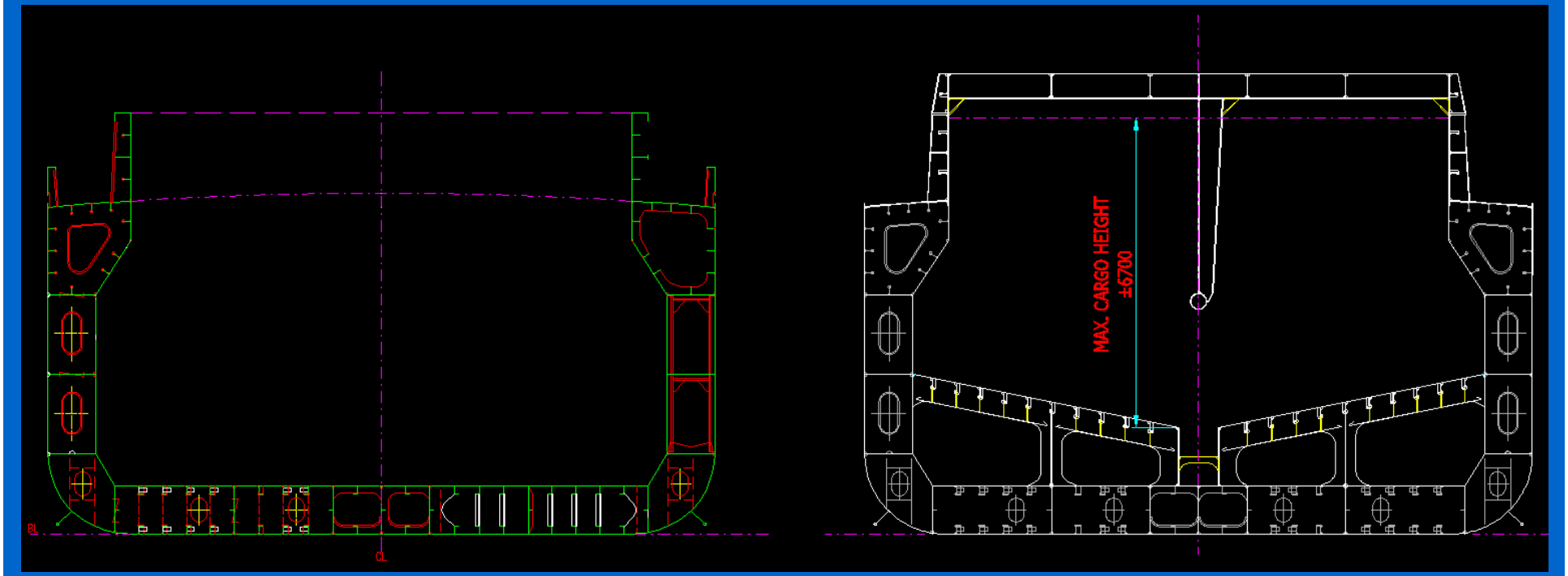
Refitting

Comparison Before/After the Conversion - GA



Refitting

Midship Section - Holds



Refitting

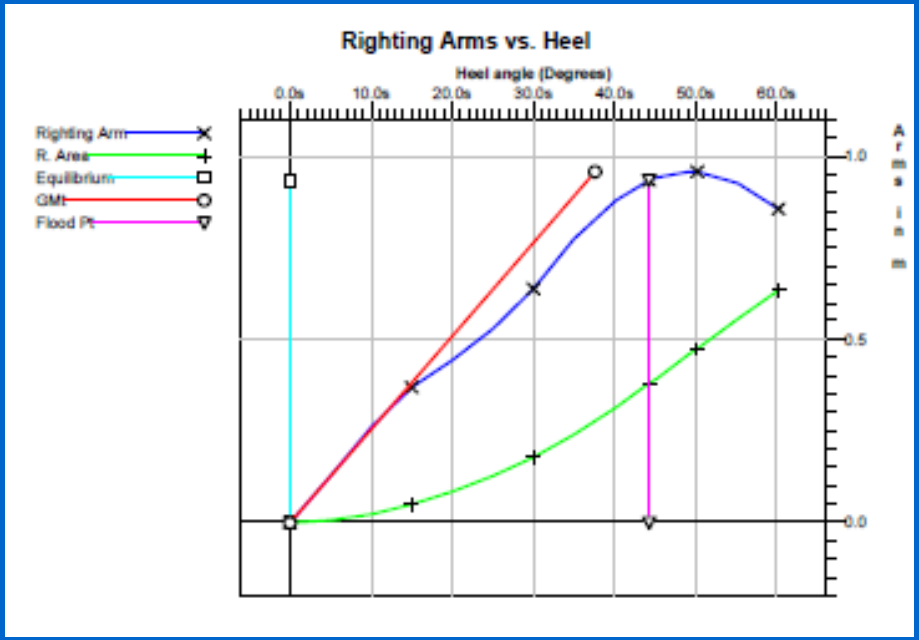
Holds

Refitting

Void Under Holds

Refitting ntact Stability – GZ Diagram

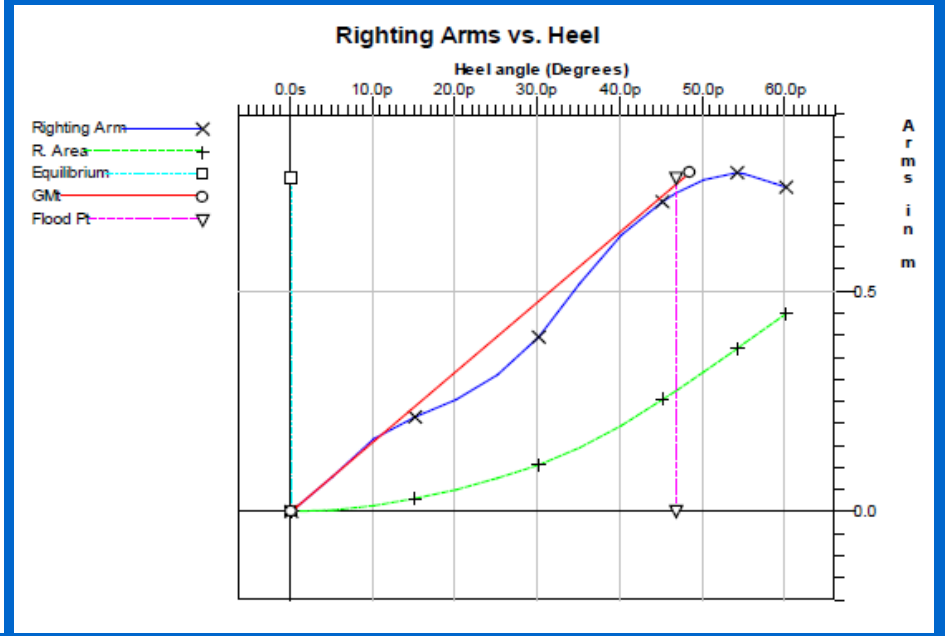
BEFORE THE CONVERSION



Limit Report

Limit	Min/Max	Actual
(1) GM at Equilibrium	>0.150 m	1.463
(2) Area from 0.00 deg to 30.00	>0.0550 m-R	0.180
(3) Area from 0.00 deg to 40.00 or Flood	>0.0900 m-R	0.314
(4) Area from 30.00 deg to 40.00 or Flood	>0.0300 m-R	0.134
(5) Righting Arm at 30.00 deg	>0.200 m	0.639
(6) Angle from 0.00 deg to MaxRA	>25.00 deg	48.97

AFTER THE CONVERSION



Limit Report

Limit	Min/Max	Actual
(1) GM at Equilibrium	>0.150 m	0.913
(2) Area from 0.00 deg to 30.00	>0.0550 m-R	0.107
(3) Area from 0.00 deg to 40.00 or Flood	>0.0900 m-R	0.197
(4) Area from 30.00 deg to 40.00 or Flood	>0.0300 m-R	0.090
(5) Righting Arm at 30.00 deg	>0.200 m	0.398
(6) Angle from 0.00 deg to MaxRA	>25.00 deg	54.00

Cruise

Cruise

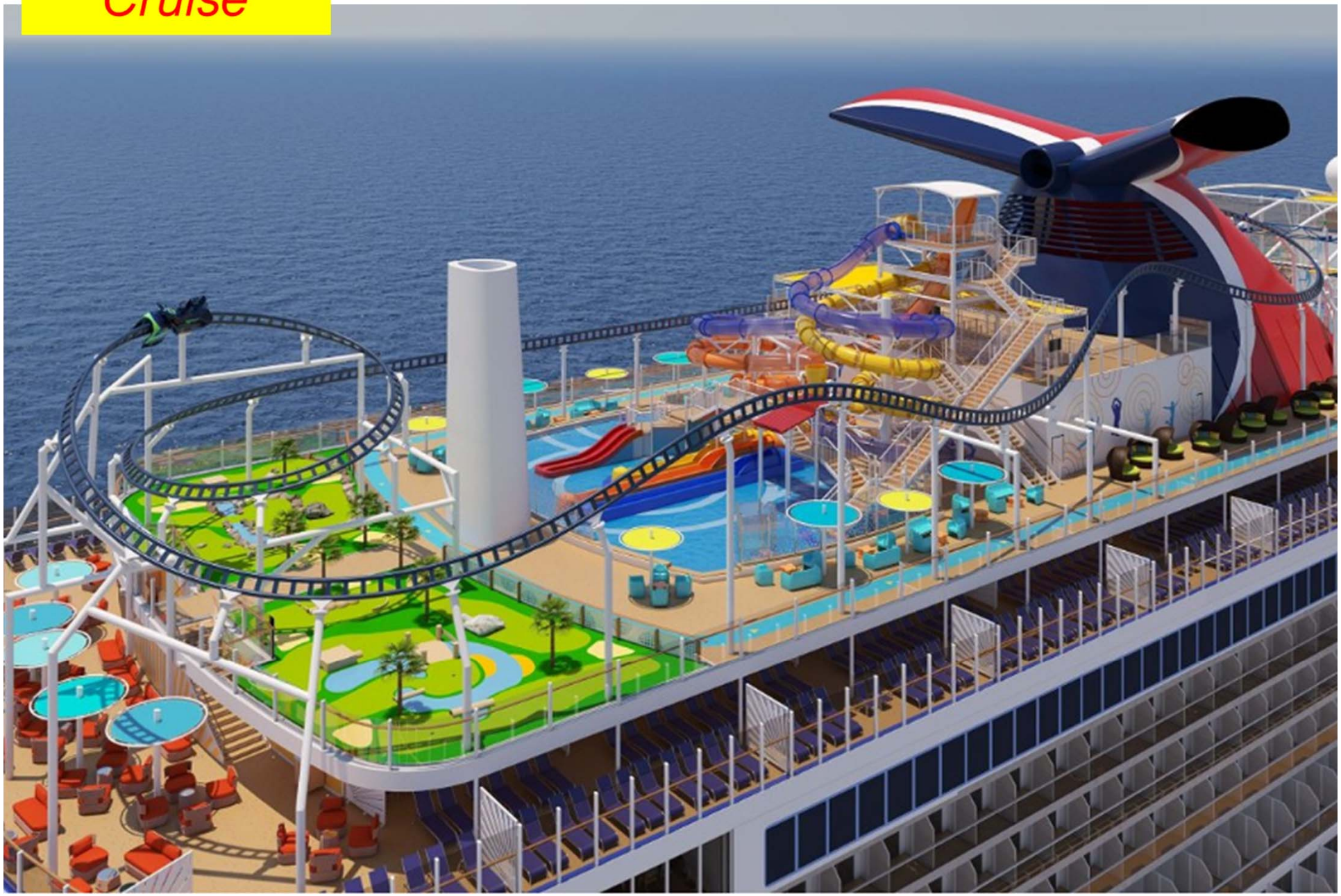
Cruise

Cruise

Cruise


Cruise
OASIS OF THE SEAS

Cruise




Grazie per l'attenzione