NOSTRA

Network Of STRAits

SAFE GREEN SHIPS

AS GOOD PRACTICE

FROM EARLY DESIGN & BUILDING STAGES

Fehmarn belt, GERMANY/DENMARK, 05.06.2013

Roman Pîrvulescu, Marian Tudor

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Environmental Aspects and Impacts

After Yonghwan Kim, Seoul National University, Korea

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Pollution from Ships

Air pollution on voyage

Sox, NOx, GHG*, PM*, VOC*

Water pollution on voyage

Waterproof oil; Bilge water; Cooling water; Grey water; Antifouling materials; Ballast water; Noise.

Ground pollution on voyage

Precipitates Wastes; Chemical residues; Oil residues

Pollution on ship recycling Paint; Plastic; Electrical product; Sealed gas; Chemical product

*GHG (Green House Gas; CO2) *PM (Particulate Matter) *VOC (Volatile Organic Compound)

After Yonghwan Kim, Seoul National University, Korea

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Following a series of naval catastrophes which result in spilling large quantities of crude oil in the ocean environment (37000 tons spilled out of the Exxon Valdez in 1989, fig.1, no less than 77.000 tons corrupted the Spain coast ecosystem after spilling out of the Prestige oil tanker in 2002,fig.2) the first to react was the U.S. Congress which adopted the Oil Pollution Act of 1990. Directions were then taken within the International Maritime Organization IMO and the International Convention for the Prevention of Pollution from Ships and regulations were enforced for new oil tankers buildings after 1990 to feature double hull, while all existing single hull oil tankers had to be withdrawn from the international waters by 2010.

nostra
network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

CO_2 emissions (grammes) to carry 1 ton of cargo 1km

*Source: The Network for Transport and the Environment

Energy used (kilowatts) to carry 1 ton of cargo 1km

*Source: The Network for Transport and the Environment

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Possible solution :

SAFE GREEN SHIPS

nostra
network of straits

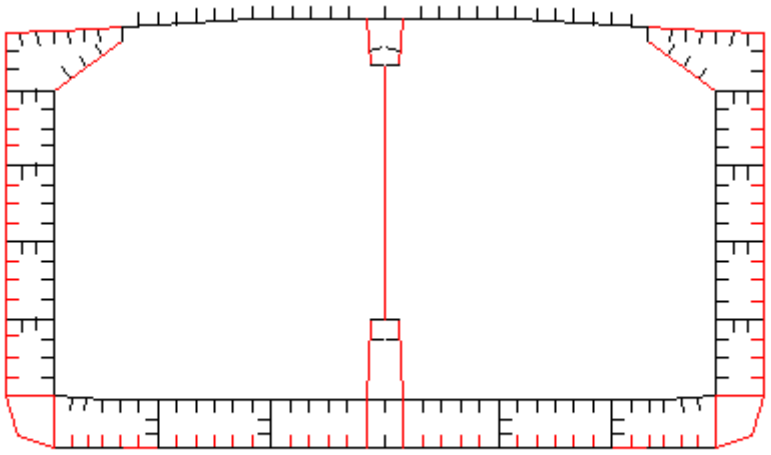
INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

SAFE SHIPS

Eg After the year 2000 the tankers (oil and chemicals) were built with double hull design:

1. Double bottom – for resistance to aground
2. Double side – resistance to impact



Category : Net Offered less than Net Required.

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

GREEN SHIPS

Future needs green ships in order to control sea and environmental pollution.

Green ship concept is nothing but building a ship with lower emission levels and other environmental hazards.

nostra
network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Pollution from Ships Tokyo Protocol (1997) MEPC(2008) (Regulations by IMO & MARPOL)

Ship Design:

EEDI(Energy Efficiency Design Index)

Ship Operation:

SEEMP(Ship Energy Efficiency Management Plan)

EEOI(Energy Efficiency Operational Indicator)

Ship Market:

MBM(Market-Based Measure, Market-Based Mechanism)

After Yonghwan Kim, Seoul National University, Korea

EEDI (Energy Efficiency Design Index) – Technical Regulation

Goal of EEDI

- Mitigate CO2 emissions
- Increase cargo carrying capacity
- Enhance speed performance

If using LNG as ship fuel,

- Reducing CO2 emission of Main engine & Aux. engine
- Reducing EEDI(=CO2/DWT X speed)

After Yonghwan Kim, Seoul National University, Korea

Key Words in Current Green Ship Technology

1. Technical Energy

- Hull optimization appendages
- New propulsion system
- Waste energy recovery and renewable energy utilization

2. Slow Steaming Operation

- Lower ship speed

3. Increase Ship Capacity

- Increase DWT

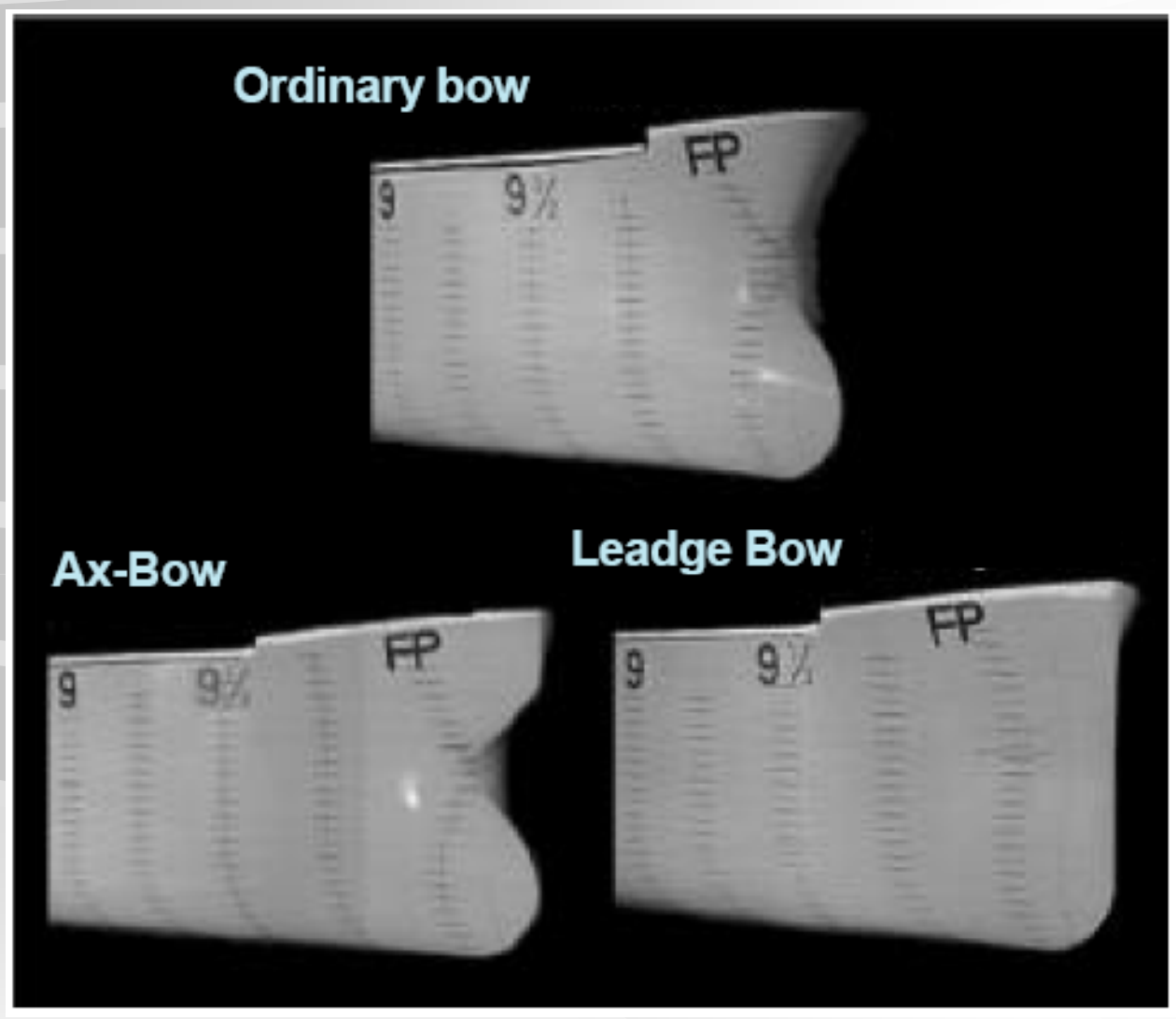
After Yonghwan Kim, Seoul National University, Korea

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Research & development role & results:



After Yonghwan Kim, Seoul National University, Korea

nostra
network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Research & development role & results:

Energy Saving Devices · Typical concepts to increase propulsion efficiency – *Making uniform stern flow* – *Reducing rotating energy loss* – *Generating more thrust by appendage* · Improves propulsion efficiency by 3% to 5%

SAVER Fin （Samsung Heavy Industry）

Pre-Swirl Stator （Daewoo Shipbuilding & Marine Engineering）

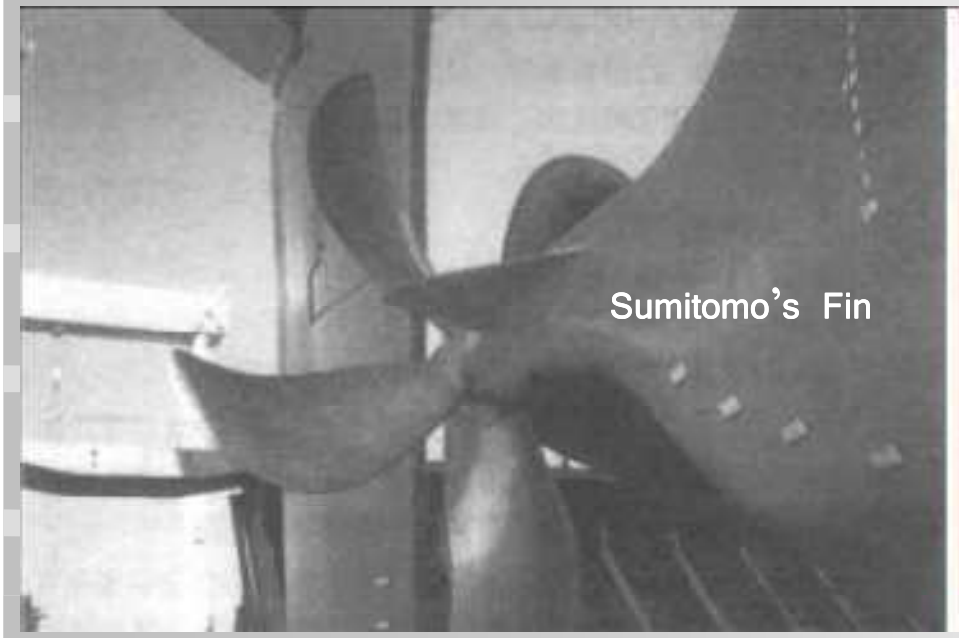
After Yonghwan Kim, Seoul National University, Korea

nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Research & development role & results:



Sumitomo's Fin

IHI's Fin

Thrust fin （Hyundai Heavy Industry）

After Yonghwan Kim, Seoul National University, Korea

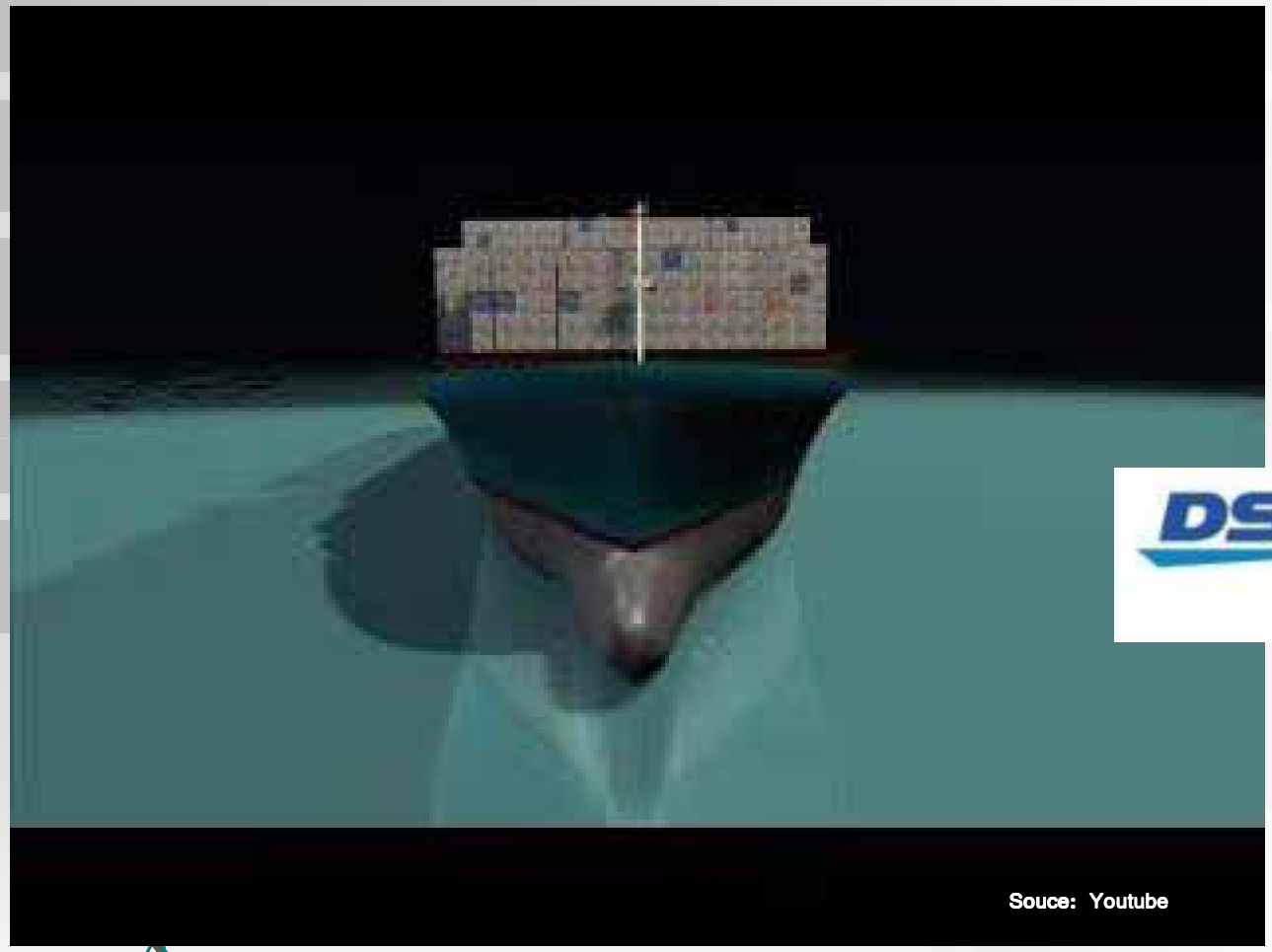
nostra network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Research & development role & results:

Maersk Line Triple-E Smarter design, with room for 18,000 containers



MAERSK

DSME
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.

nostra
network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

In conclusion, research coul contribute to:

·Changes in design and production of marine vehicles, structures and associated systems and services

coupled with

·societal demands of green technology applications, reduction of environmental pollution and requirement of higher standards of performance.

nostra
network of straits

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund


THANK YOU FOR YOUR ATTENTION !