

2016 Korean-Hellenic Maritime Cooperation Forum

STRATEGY TO DEVELOP SMALL-MEDIUM SHIPBUILDING INDUSTRY

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- ② Shipbuilding Industry of Korea
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01



World Shipbuilding Industry

World Shipbuilding Industry



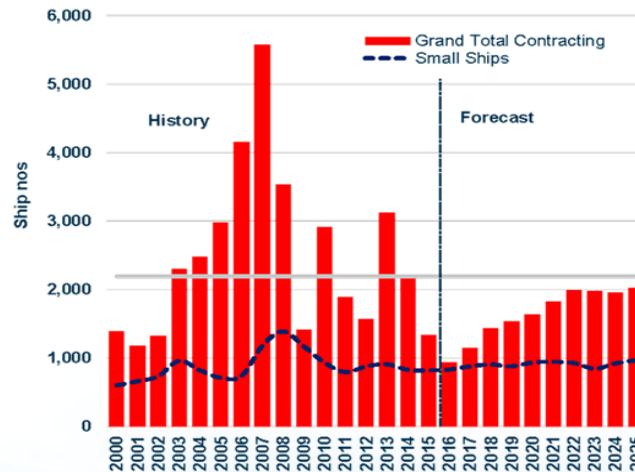
- World Recession → Reduction of the quantity of goods transportation
- Low oil price → Freeze of the offshore plant market
- Low growth rate of China

Contracting Forecast (Ship Nos)



Clarksons
Research

Long-Term Contracting 2000-25



- Number of contracts for vessels projected to remain relatively subdued in short-term, recovering to 1,981 in 2022
- Number peaks next in 2022 before another cycle starts with increasing number of contracts from 2025.
- Contracting remains below the historical average throughout the forecast period.
- Average number of contracts 2018-25 equal to 1,792.
- Around c.192 units per annum down from previous forecast 2018-24.
- Product mix changing in long-term.

World Shipbuilding Industry



- Drastic down of oil price
- Shale Oil Drilling from 2014
- How much will it be at the end of 2016?

Over 50% Drop in Crude Oil Price



02



Shipbuilding Industry of Korea

- Historical Shipbuilding Shares
- Contracting Forecast

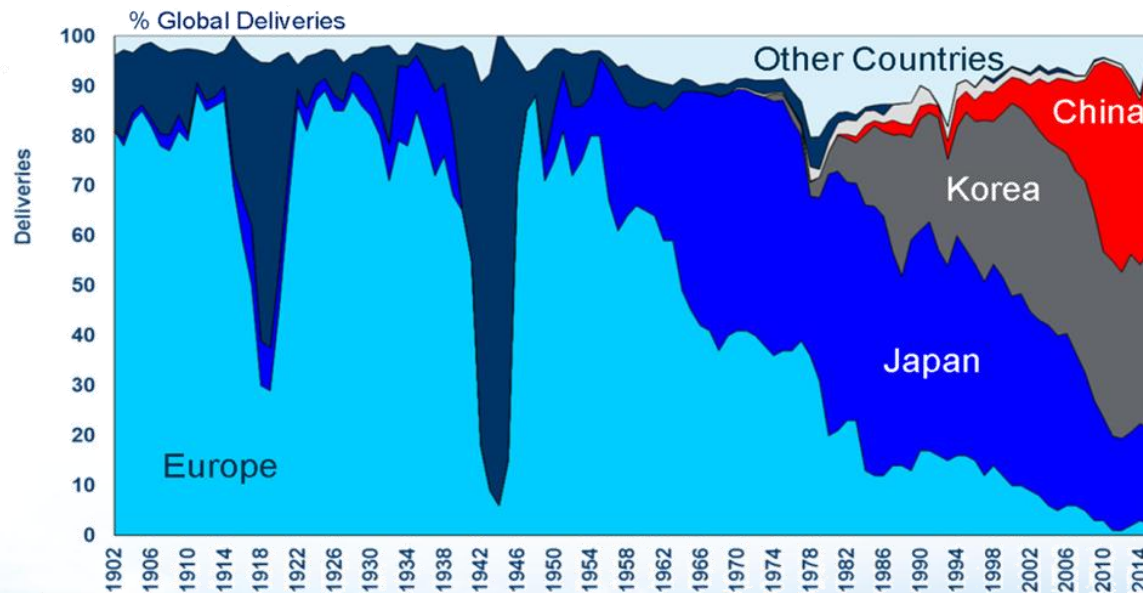
Shipbuilding Industry of Korea



- Large Export Vessel Construction in the National Economic Development Plan after WW II
- Korea has been the leading shipbuilding country in the world since 1999.



Historical Shipbuilding Shares



Shipbuilding Industry of Korea



- Three Major Shipbuilding Companies try to reduce the number of employees
- Big Deficit due to Offshore Plant Construction



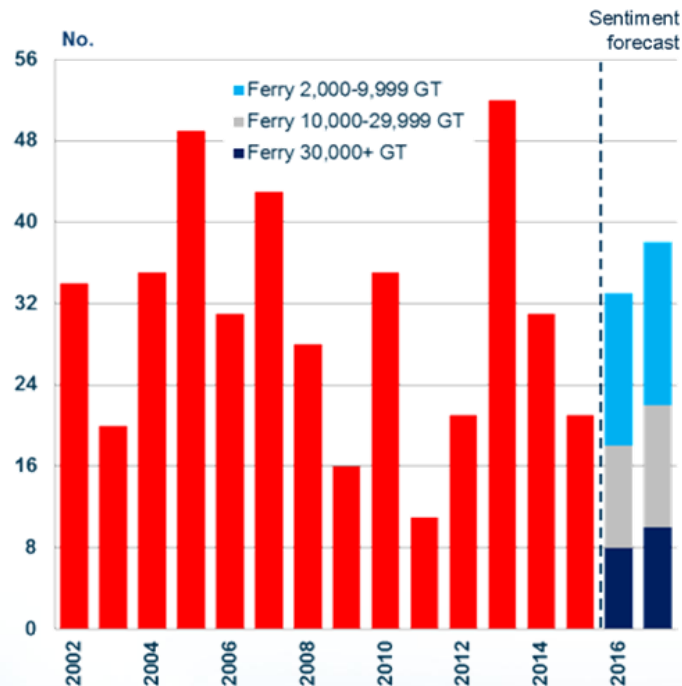
03



Small and midsize Shipbuilding Industry



Ferry - Order Potential Increasing



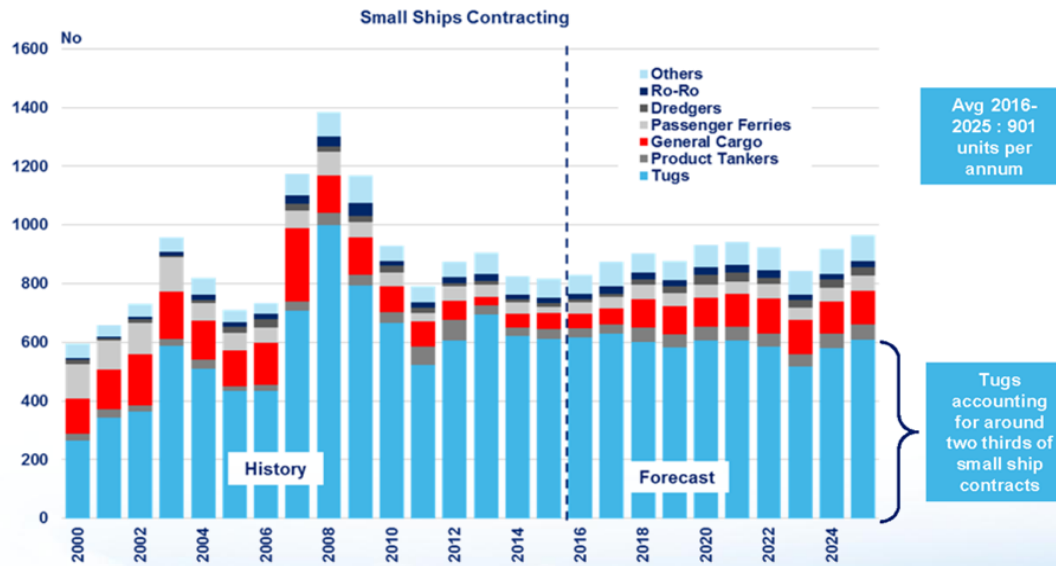
- A year ago we said "The market is slowly starting to tighten and there is now upside to order volumes over the next couple of years." Ro-Pax charter rates have increased from a low of euro 15,000 per day to euro 25,000 per day in recent years
- Secondhand prices firm, making newbuild prices look attractive. Again yards more willing to build single or two ship series orders. Many Chinese yards with PCC experience would look to this sector.
- Most of the major players have healthy financials and are looking to order ships. Series orders likely to go to the Far East, one off orders probably Europe with Turkey increasing competitive. LNG becoming more common as a fuel but creates issues for small ships.



- Small Ships Contracting is supposed to be not bad.
- Short-term and Long term analysis shows the continuous order.



Small Ships Contracting Projection



Small and Midsize Shipbuilding Industry



- Jeonnam was the headquarter of Admiral Lee, Soon—shin and of Maritime King Jang, Bo—go
- Late Start in the Modernization of Shipbuilding Industry
- Many Islands (2000/3000) and Beautiful Coastlines
- Center of Triangle Trade between China, Japan and Korea

Small and Midsize Shipbuilding Industry



- Many midsize shipbuilding companies were bankrupt since 2008 financial crisis and aftermath in Korea
- Big needs for the new car ferries construction after the Se-wol disaster in 2014 stimulated the design for the small and midsize ships.
- Modernization of the fishing boat and seaman's quality of working life.
- Leisure boat market is always mentioned as the future blue ocean.

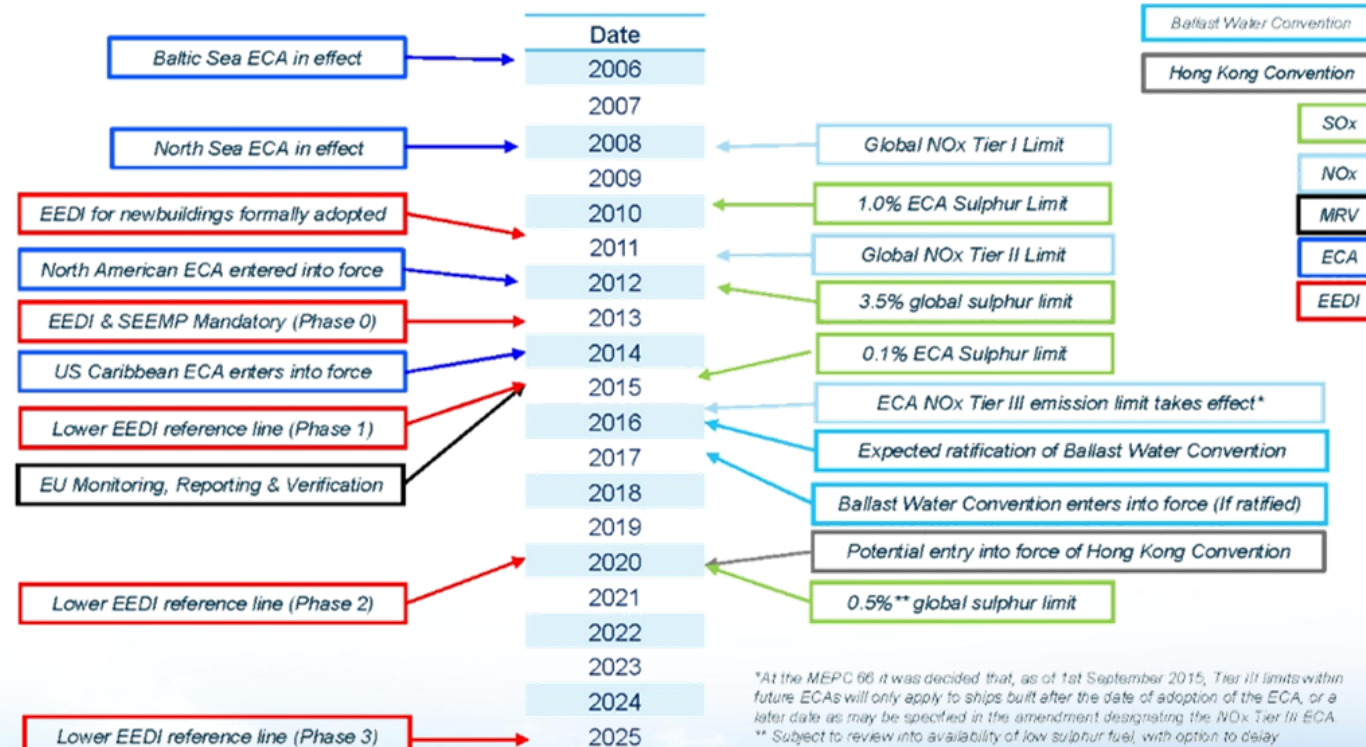


- Eco–friendly ship development to reduce CO2 emissions and fuel consumption
- Optimum hull form development with ESD application for the small and midsized flagships.
- Lack of design manpower and engineering power to study the optimum ESD application

Environmental Regulation Timeline



Environmental Regulation Timeline



04



Research Consortium

Research Consortium



- Provide Working Opportunity to Young Generation in Local Government
- University : Hull form Optimization, Numerical Calculation, Optimum Structural Analysis to reduce the LWT
- Design Companies : Basic Design, Hull form Design with Tank Arrangement
- Research Institute : Towing Tank Test, ESD Development
- Target : Design the flagships of each type to get 8% reduction of DHP compared to the recent vessel

05



Development Procedure

Hull form Design

CFD

Model Test



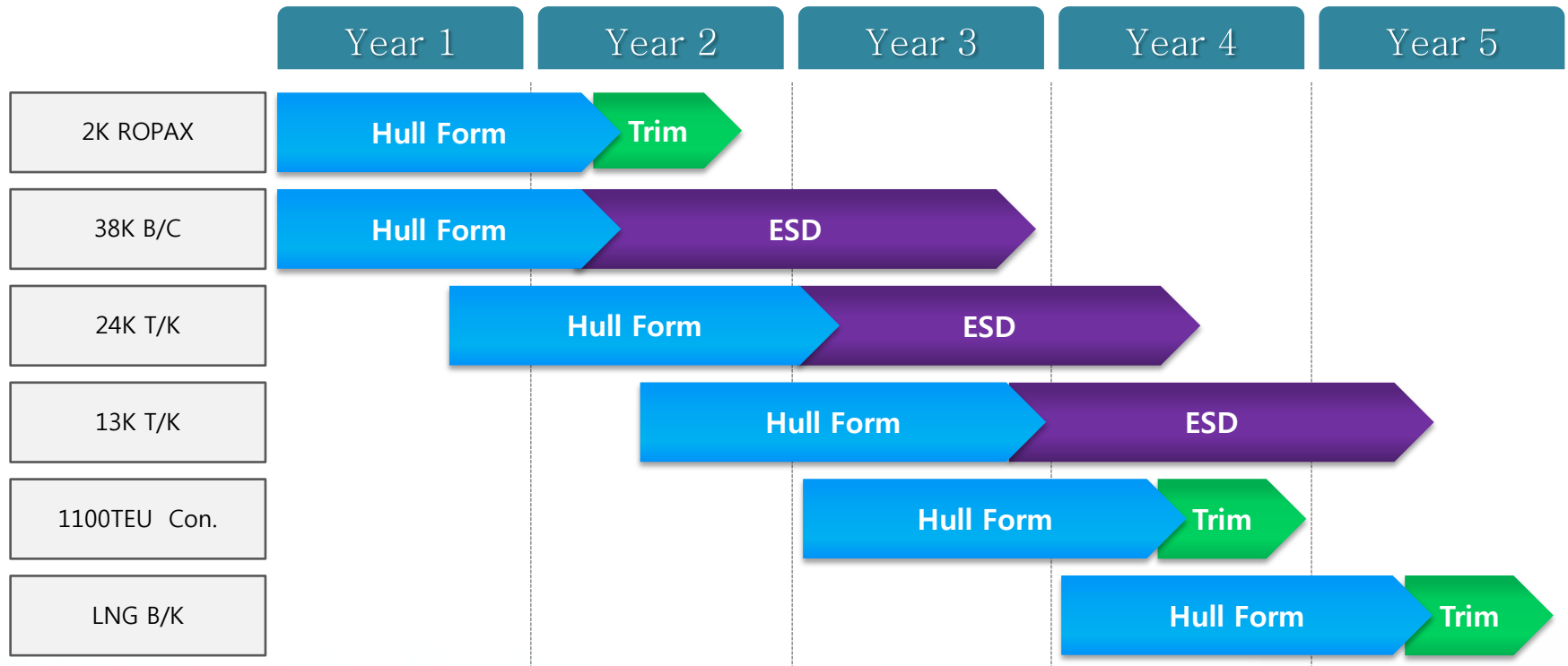
Final Target of the Technology Development

Hull form Developments and ESD Application for the Eco– friendly Flagships
Car ferry (G/T 2K), Tanker (DWT 13K & 24K), Bulker (DWT 38K),
Container (1,100TEU), LNG Bunkering Ship (5K m³)

- Resistance and Propulsion Characteristics thru Towing Tank Test
- Highly Efficient Hull form Development to satisfy EEDI rule
- Initial Trim for the Minimum Resistance
- ESD design Technology for the small and midsize flagships

- ✓ Flagships Characteristics
- ✓ THP Efficiency Increase
8% THP Reduction
- ✓ Optimum Trim Change
- ✓ ESD application

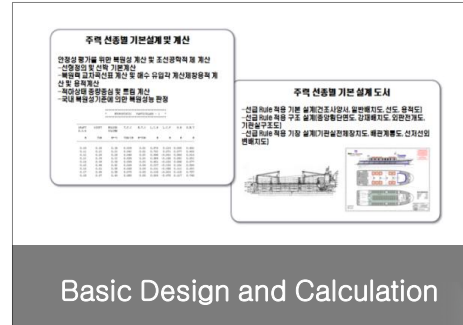
Development Procedure



Development Procedure



Final Target of the Technology Development



To the **World**



Open Booth in **Posidonia**

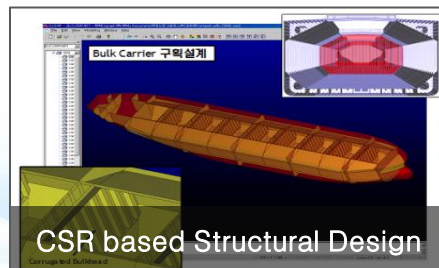
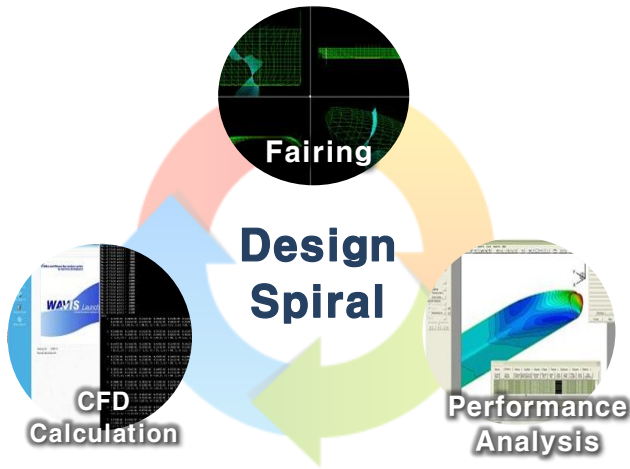
Development Procedure



Final Target of the Technology Development

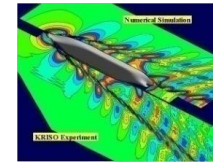
Research Plan

- ✓ Hull Form Development using CFD
- ✓ Basic Calculation using NAPA, EzSHIP
- ✓ Rule Based Basic Structural Design
- ✓ Cargo Tank Structural Analysis using FEMd,f

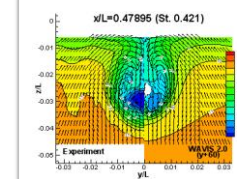


Hull Form Development of Flagships

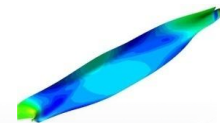
Wave
Pattern
Analysis



Wake
Analysis



Hull
Surface
pressure
prediction



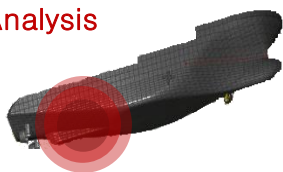
Development Procedure



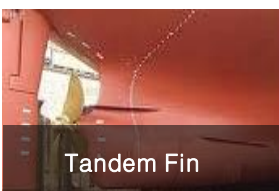
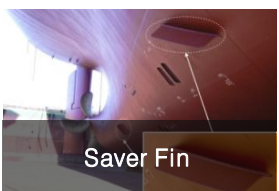
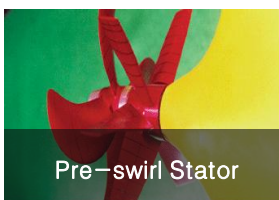
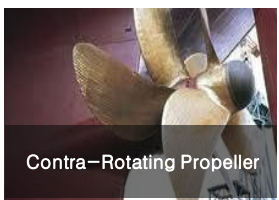
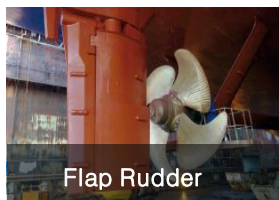
Final Target of the Technology Development

Optimum ESD and Propeller Design

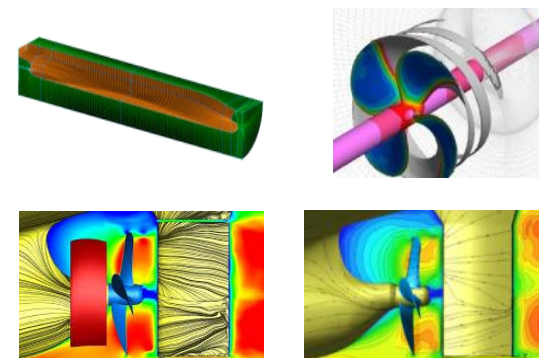
Energy Efficiency Analysis



- ✓ Ship Types
- ✓ ESD and Propeller Characteristics



- ✓ Flow Analysis of ESD
- ✓ Propeller Design
(ANSYS CFX, Fluent, kpa4b)



Development Procedure



Future Market Analysis Committee

- Domestic and Global Shipping, Shipbuilding and Financial Market Analysis
- Ship Type Decision thru Future Needs Prediction
- Consultants from various Areas



06

Flagships



Flagships



Small and Midsize Flagship Development



Eco-friendly Efficient hullform Developement with ESD
5 ship types → Function Assesment → Basic Design



Flagships Marketing

Flagships



G/T 2K Passenger Ship

- Old ships over 21 years is 24% → Renewal within 5 years
- Domestic Car Ferry Market : Used Ships due to Low Budget
- Safety Issues Emergencies by the Se-wol Disaster affects
Strict Construction Rules : Increase Cost and Building Period
- Concerned to New shipbuilding with Domestic Technology
rather than importing Used Ships from abroad

G/T 2K Passenger Principal Parti.

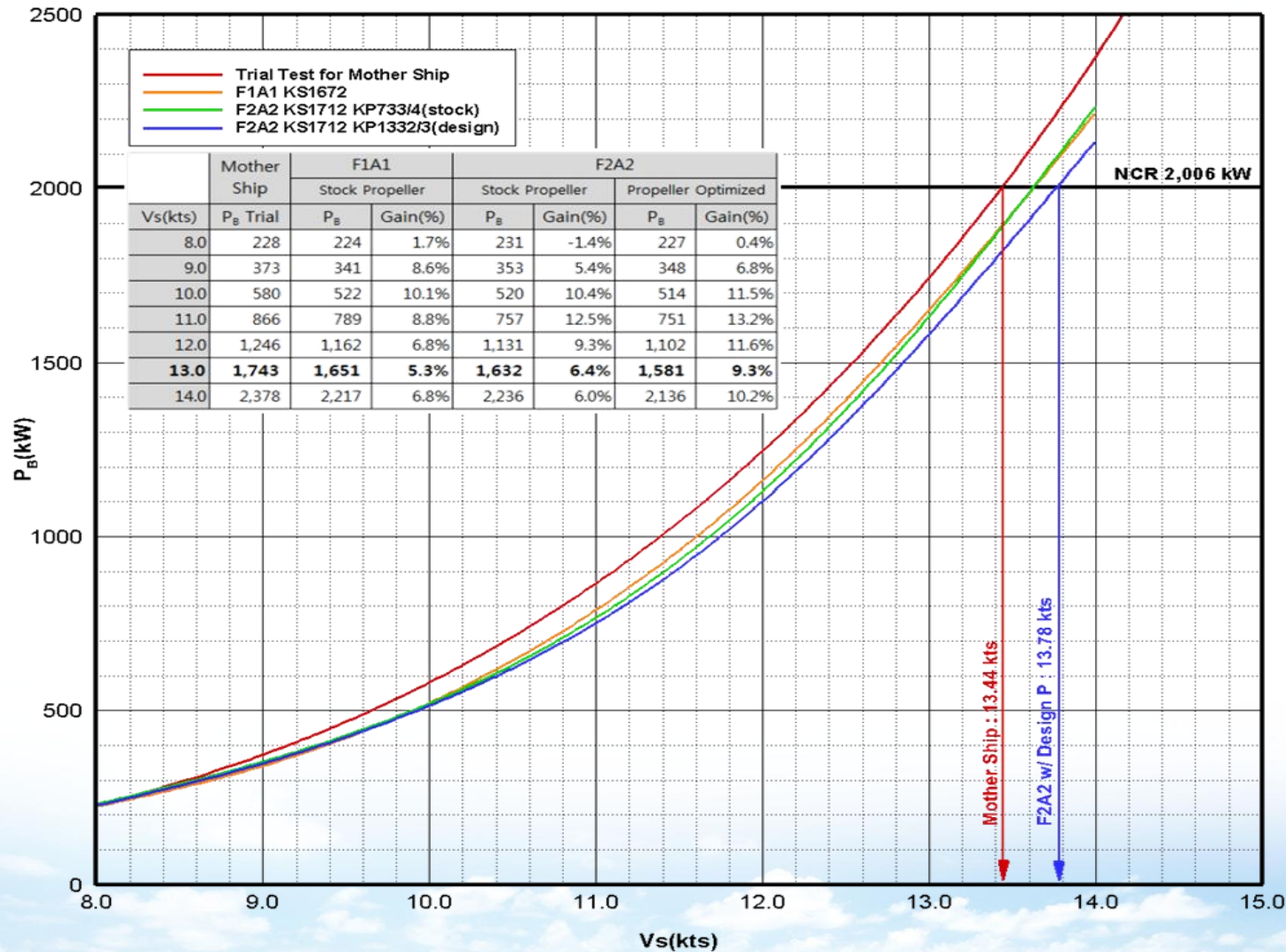


2014.05 Approval	Construction
Item	Dimensions
LOA	70 m
LBP	56 m
B	14 m
D	3.5 m
draft	2.5 m
Design Speed	11.0 kts

Result of Hull Form Development



G/T 2K Passenger Ship





How to design 2K G/T Ropax to satisfy the target

1. Reducing the hull curvature especially on stern bottom to reduce form resistance
2. Light weight control to optimize the trim condition
3. Propeller design optimization
4. Trim optimization by towing tank test
5. Application of high fidelity CFD to hull form development

Flagships



Tanker

【 DWT 13K & 24K Tanker 】

- Old ships over 30 years is 123 → Renewal within 3 years
Old ships over 20 years is 121 → Renewal within 5 years
Recent 3 years world fleet order 64 vessels
- Strong Possibility of orders for the small and midsize shipbuilders

DWT 38K Bulker 기준선 제원



2014.08 Approval	Construction
Item	Dimensions
LOA	181 m
LBP	175 m
B	30 m
D	15.2 m
draft	10.1 m
Design Speed	13.8 kts

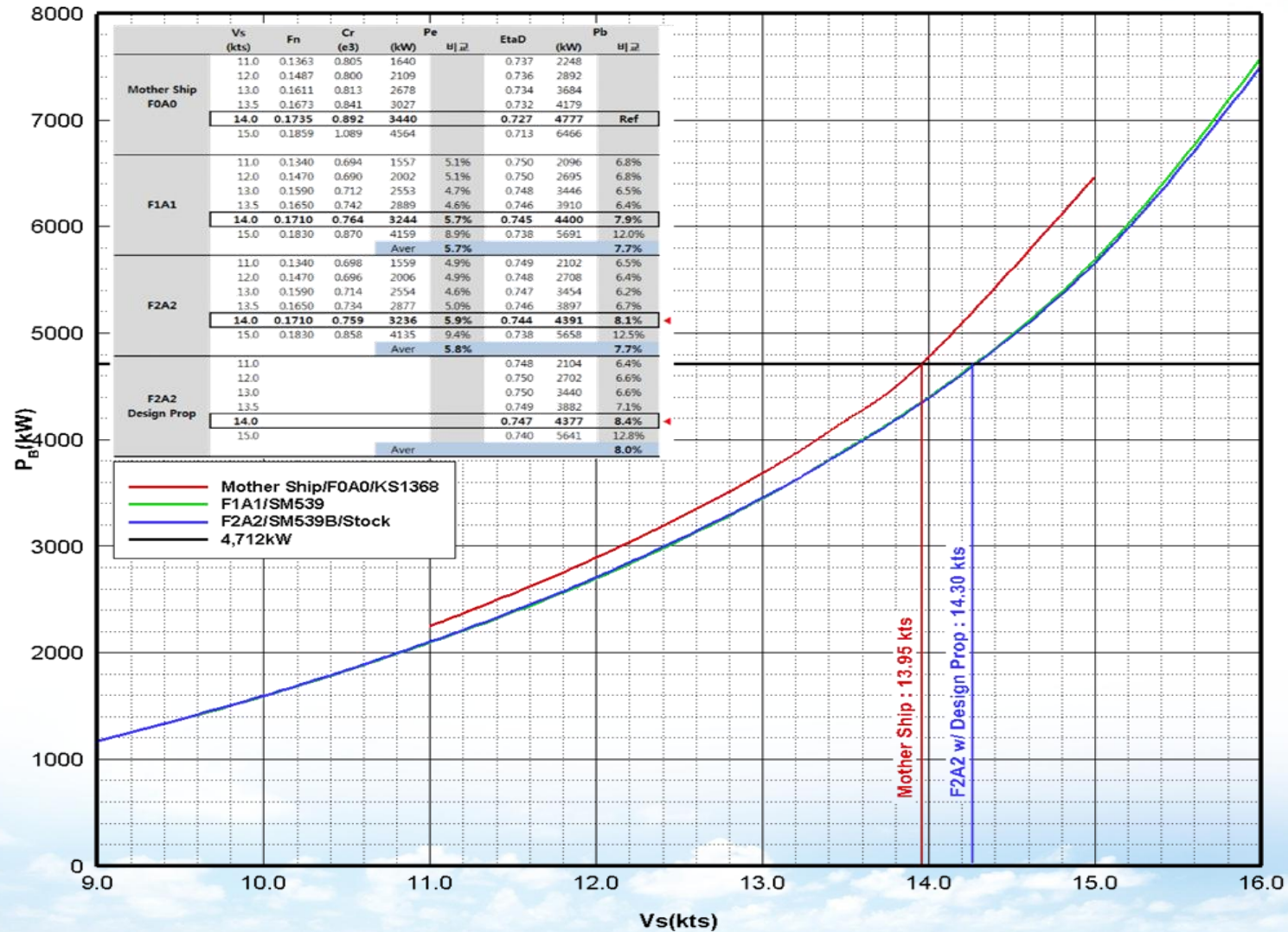
DWT 38,000 TON CLASS BULK CARRIER



Result of Hull Form Development



38K Bulk Carrier





How to design 38K B/C to satisfy the target

1. Bow hull form for low wave resistance
2. Stern hull form for low form drag and high wake efficiency
3. Vertical type bulbous bow adaption to enhance the hull slenderness
4. Application of high fidelity CFD to hull form development
5. Structural optimization and reduce light weight by 140 tons

Flagships



– Container –
【 1100TEU Container 】

- World Shipbuilding Market Bad Condition
- Big Containers will be strongly affected by World Market and the Opening of Panama Canal
- Good Market for the small and midsize container



- Dual Fuel Engine and LNG Ship increase in numbers
- Strong environmental Issues accelerate the LNG fuel.
- Blue Ocean of the next Generation

– LNG Bunkering –

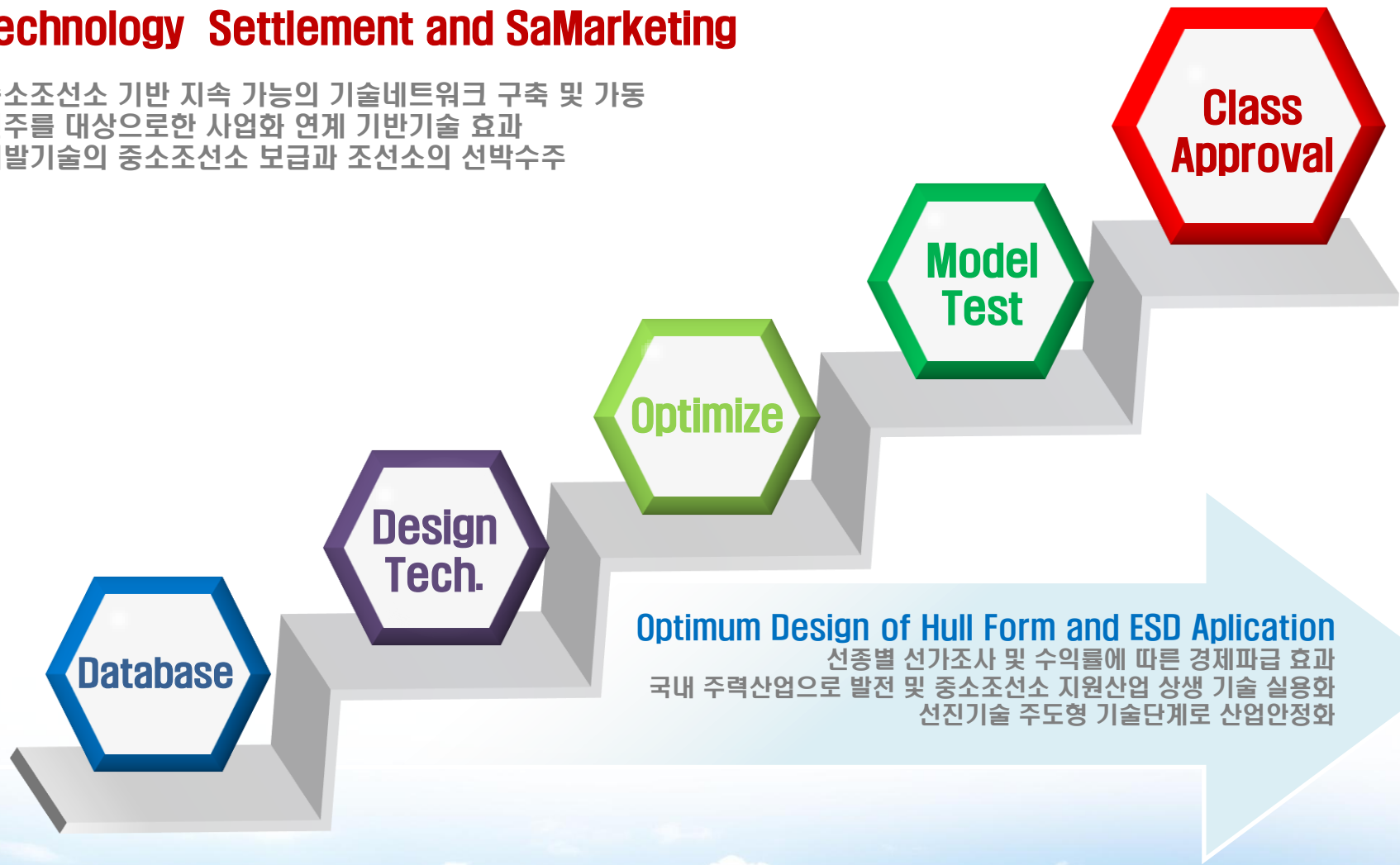
【5K^{m³} LNG Bunkering】

Global Marketing of the Flaships



Technology Settlement and SaMarketing

중소조선소 기반 지속 가능한 기술네트워크 구축 및 가동
선주를 대상으로한 사업화 연계 기반기술 효과
개발기술의 중소조선소 보급과 조선소의 선박수주



Q & A



THANK YOU!

