

Advanced Nation Type Ship Recycling System Pilot Model Project in Muroran

先進国型シップリサイクルシステム 室蘭パイロットモデル事業



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Introduce



**Keyword: High Value-added
高付加価値化**

Kazumichi SHIMIZU (1961.10.27)

Education

- 2001. 9 Ph.D. in Hokkaido University
- 1986. 3 Graduated from Faculty of Engineering & Graduate school of Engineering, Hokkaido University
- 1983. 3 Graduated from Oita National College of Technology where majored mechanical Engineering

Employment

- 2004. 4 ~ present Materials and science Department, Muroran Institute of Technology
- 1989. 4~2004.3 Oita National College of Technology
- 1986.4~1989.3 Nippon Steel Corporation, and assigned to Plant section

Research Interests

Engineering materials, Tribology, Design Engineering, Strength of Materials

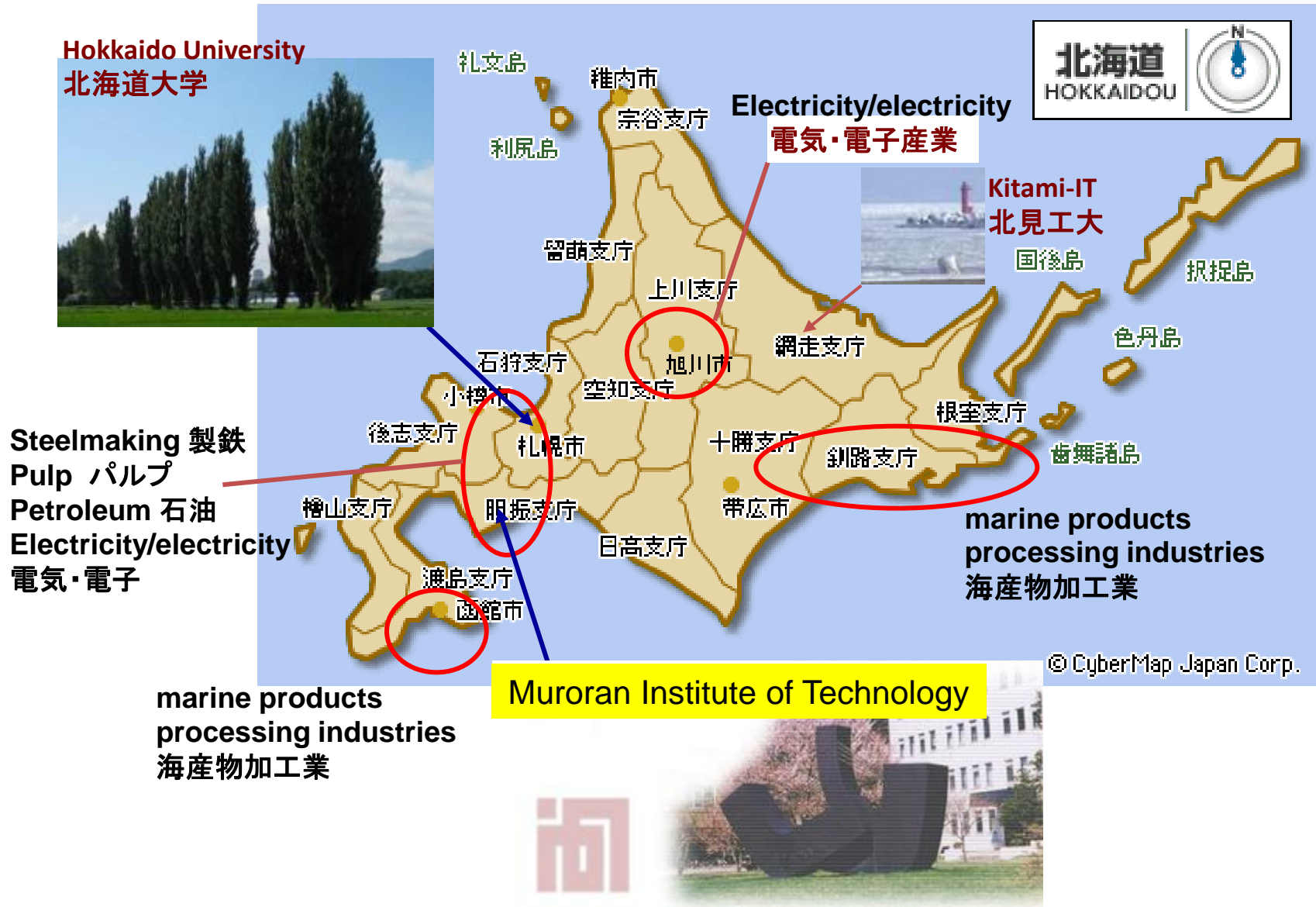
Awards

- National High service selection 300 (2009)
- Sokeizai collaboration grand prize (2009)
- Hakuho Prize awarded for Regional contribution (2009)
- Prize of Sokeizai Center Director (2008)
- Japan Monodzukuri grand prize (2007)
- Teacher prize, Institute of national Colleges of Technology, Japan (2003)
- Excellent presentation at Japan Society for Design Engineering (2001)
- Award of Kusaka, Japan Foundry Engineering Society (2000)
- Prize for encouragement, Japan society of graphics science (1997)

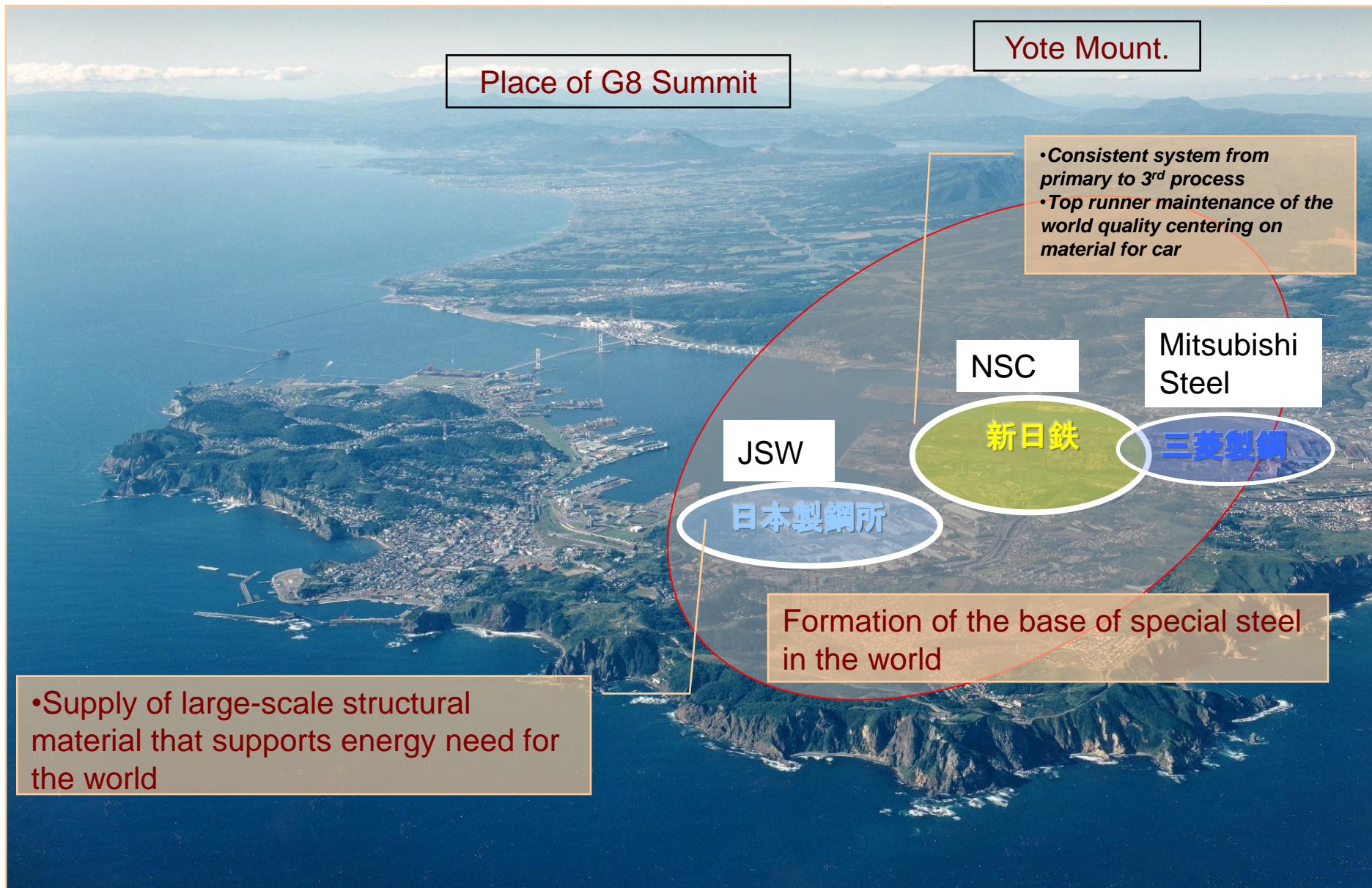
Social Activity

- ISO/T25 a member of Japanese Delegate(2009~)
- A member of selection committee of Japan's Monodzukuri grand prize/ the chairperson of Hokkaido (2009~)
- A member of ship recycling committee of Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and the chairperson of ship recycling research committee (2008~)
- An technical Advisor of Muroan techno center (2005~)
- An technical Advisor of technique/marketing communication plaza in Nakatu (1996~)
- An Advisor of [water drop] group in Noboribetsu (2005~)

Muroran Pilot Model Project, advanced nation type ship recycling system



Muroran Pilot Model Project, advanced nation type ship recycling system



Muroran Institute of Technology

◆ Undergraduate student 工学部学生		2,877	(female 216)
◆ Graduate student 大学院生	(Master's course)	468	(40)
	(Doctor's course)	65	(7)
Sum.		3,410	(263)
◆ Faculty and staff 教職員		295	(faculty 190)

※ a large scaled Engineering College in Japan (15/55 Colleges)

※ 4~6 students / 1 instructor



Guide the students carefully きめ細やかな指導

Practical Education of Muroran-IT 室蘭工業大学の実践的教育の充実

Support practical manufacture education

実践的なものづくり教育を支援

→ (Education 教育)

Supply a place for learning and making things freely

学生が自由にモノを創る学習の場を提供

→ (Learn 学習)

Promotion of advanced machining technology

先端的な加工技術の研究を推進

→ (Research 研究)

Coordination of Citizen, educational institutions , and Companies

地域市民, 教育機関, 企業等と連携 → (Regional coordination 地域連携)



Machining practice · Tatara iron making practice · Casting practice · Forging practice
Approx. 1,500 person per year (ものづくり体験教室・たたら実習・鑄造教室・鍛造実習 年間1,500名)



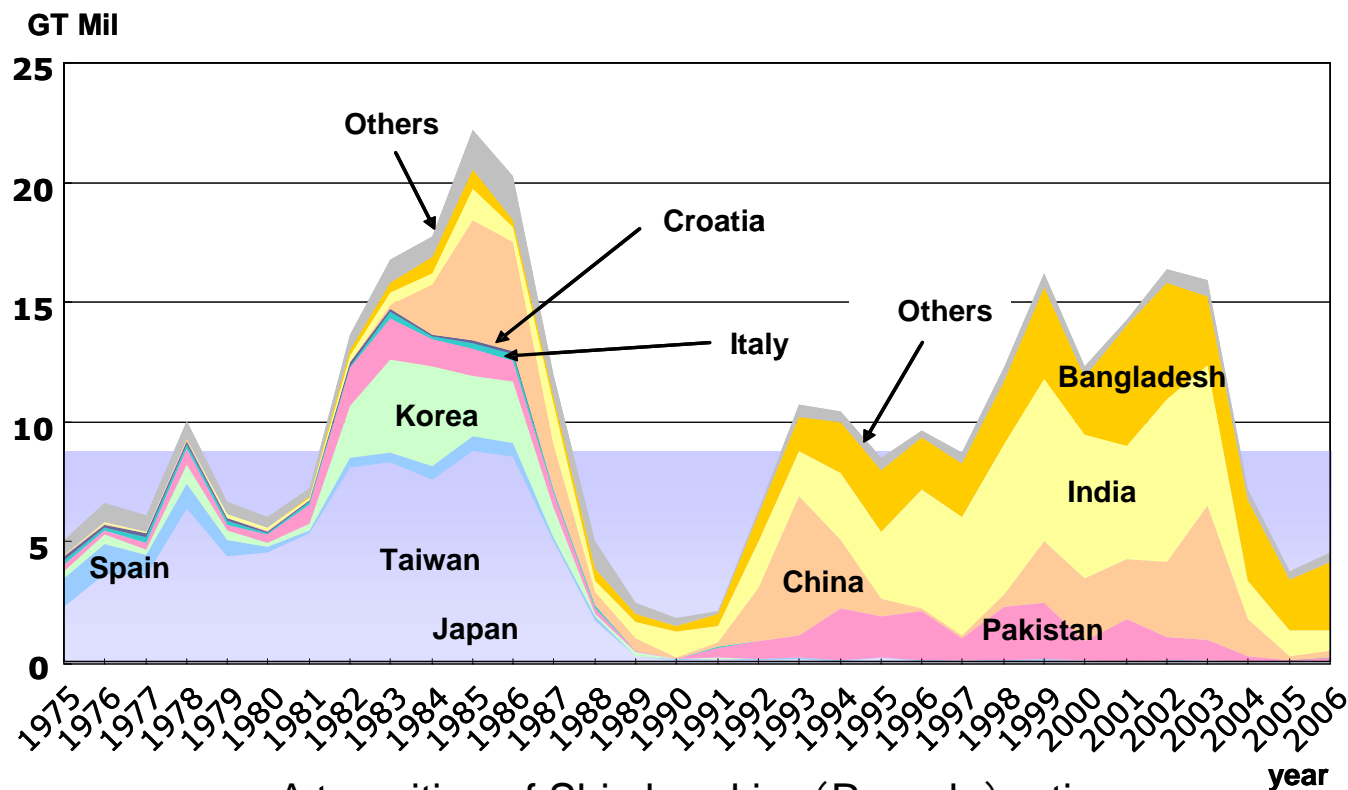
Ship Recycling

シップリサイクル

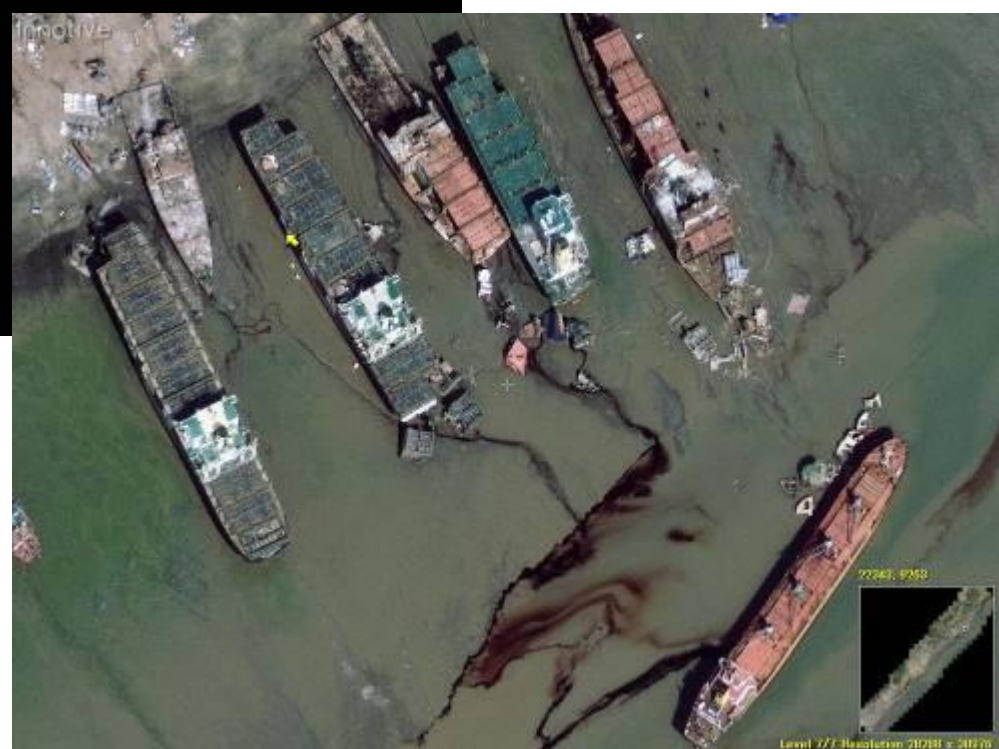
A transition of ship breaking (recycle) country

船舶解撤(リサイクル)国の推移

- Ship being disposal is not [Wastes] but **[Resources (valuable)]**.
解体船は「廃棄物」ではなく「資源(有価物)」
- The country that can buy ship in high prize becomes the country of ship breaking.
高い価格で船を購入できる国が解撤国となる。
- Condition of ship breaking nation: steel shortage, low labor cost, low environmental standards
解撤国の条件: 鉄不足、低人件費、低環境基準



A transition of Ship breaking (Recycle) nation



an aerial photograph
A harbor of Alang, India
衛星写真
インド・アラン地区での 海岸線

An on-site inspection in Bangladesh
 Bangladesh現地視察



An on-site inspection in Bangladesh, Feb. 2010

Bangladesh現地視察



Features of Pilot Model Project in Muroran

パイロット事業の特質

1. National project based on international Convention

国際条約を背景とした国家プロジェクト

→ aim for construction of 「advanced nation type」ship recycling system.

Need new effort. 「先進国型」シップリサイクル構築が目的。新しい取組が必要。

2. Expected as regional revitalization (in Muroran)

地方都市(室蘭)の「元気再生」として期待

→ continue even after the pilot project. Policy for making profit is needed.

パイロット事業後も継続。採算が取れるための施策が必要。

3. Promotion of project by a joint venture firstly organized.

初めて組織される共同企業体による事業の推進

→ construction of supervision system is needed.

監理体制の構築が必要。

4. Not an exclusive yard, but a wharf/site of harbor region for ship breaking

解体専用ヤードではなく、港湾地区の岸壁・用地を借用しての解体工事

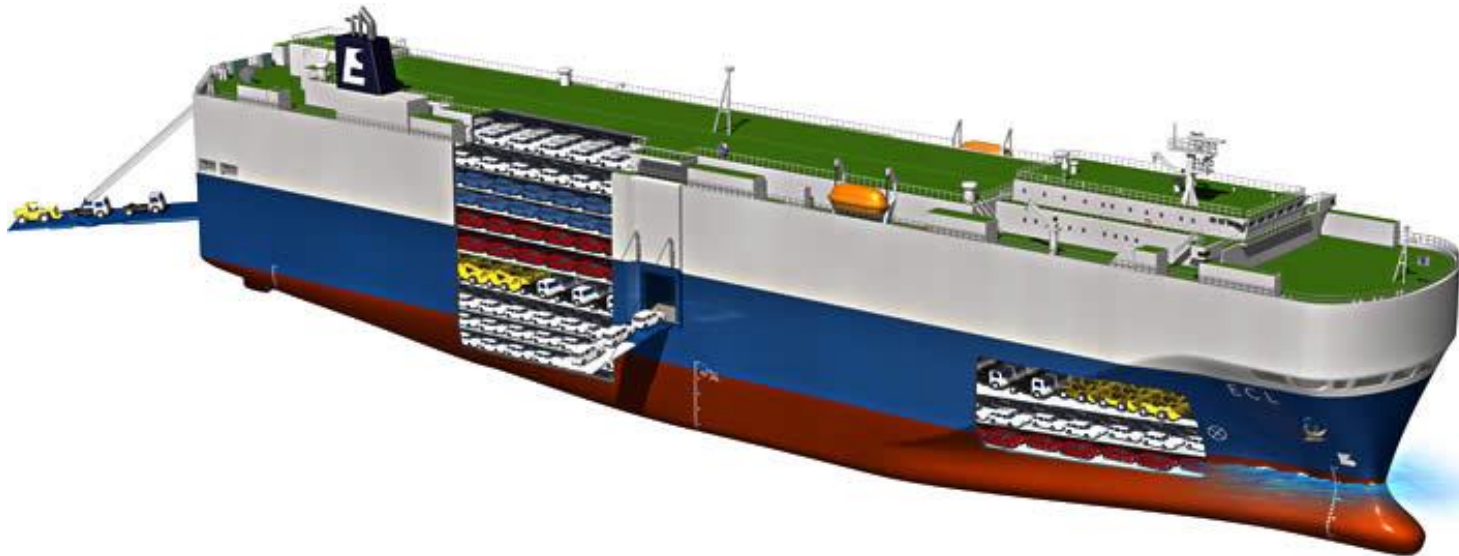
→ consideration toward ship under way , surrounding facilities , local citizen, etc.

航行船舶、周辺施設、近隣住民等への配慮が必要。

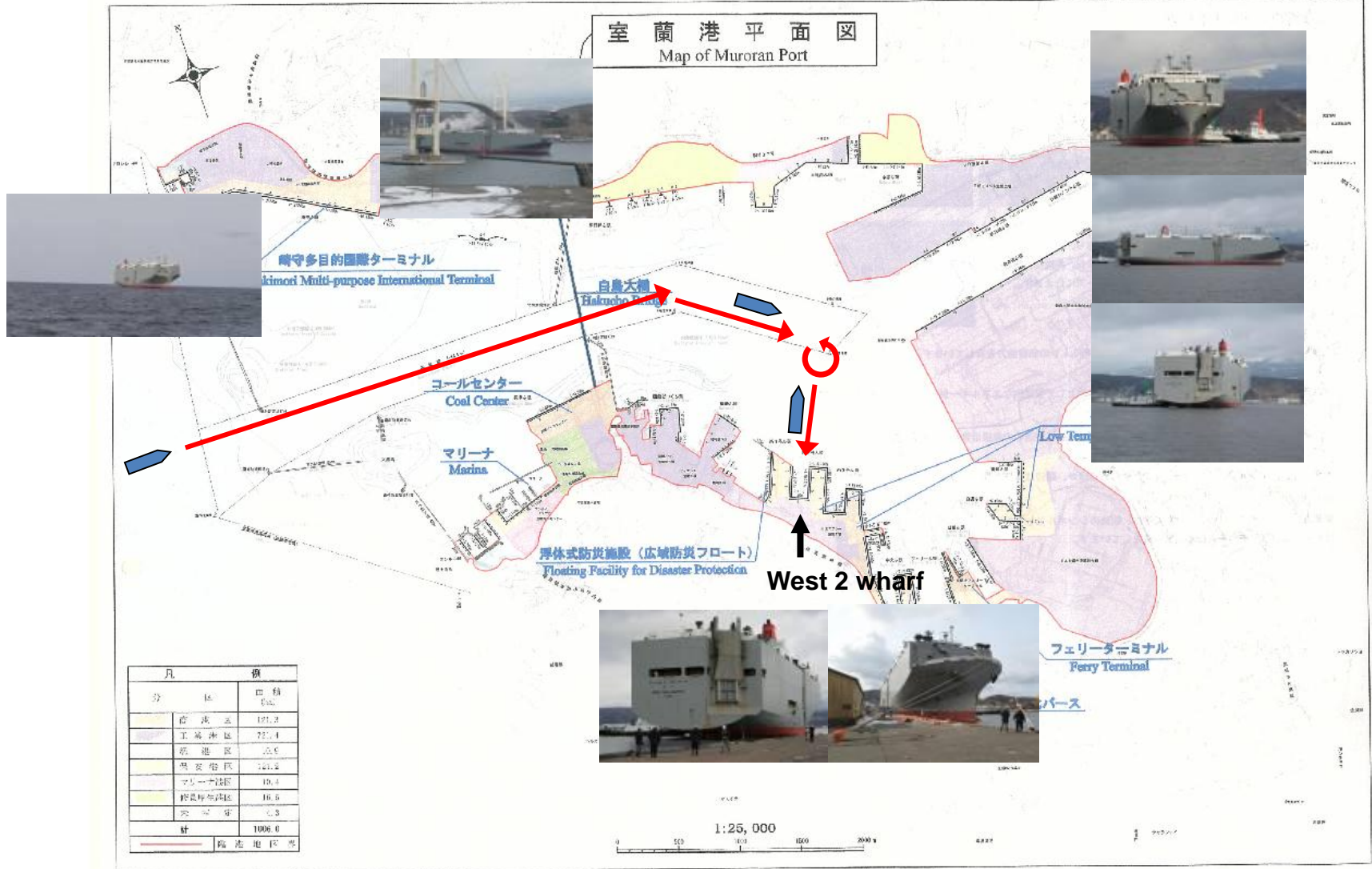
Establishment of a System for putting the Project into practice

確実な事業実施のための体制確立

Pure Car Carrier; PCC

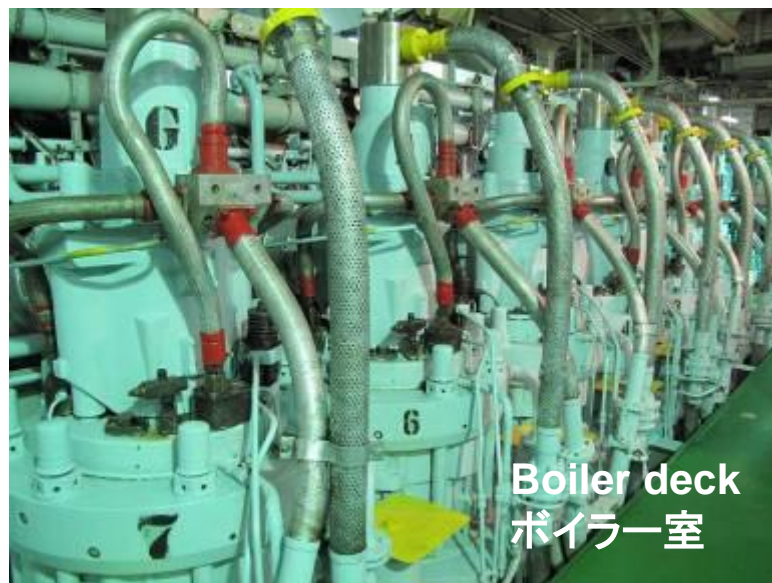


On 9 March, 2010 “New York Highway” enter port
 平成22年3月9日 「にゅーよーくはいうえい」 入港



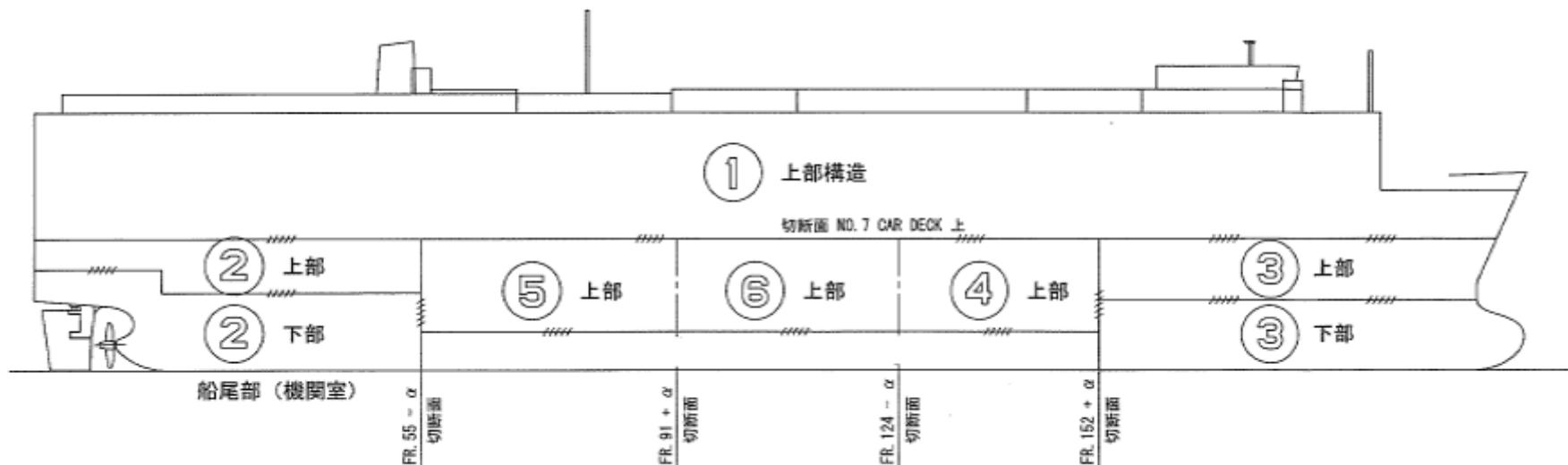
Muroran Pilot Model Project, advanced nation type ship recycling system

On 9 March, 2010 , PCC “New York Highway” entered the Muroran port



Dismantling order of Pure Car Carrier

自動車運搬船解体実証実験 ～解体要領の概略～



An advanced afloat ship dismantling plan アフロート方式による解体

• **The order of dismantling** 解体の順番

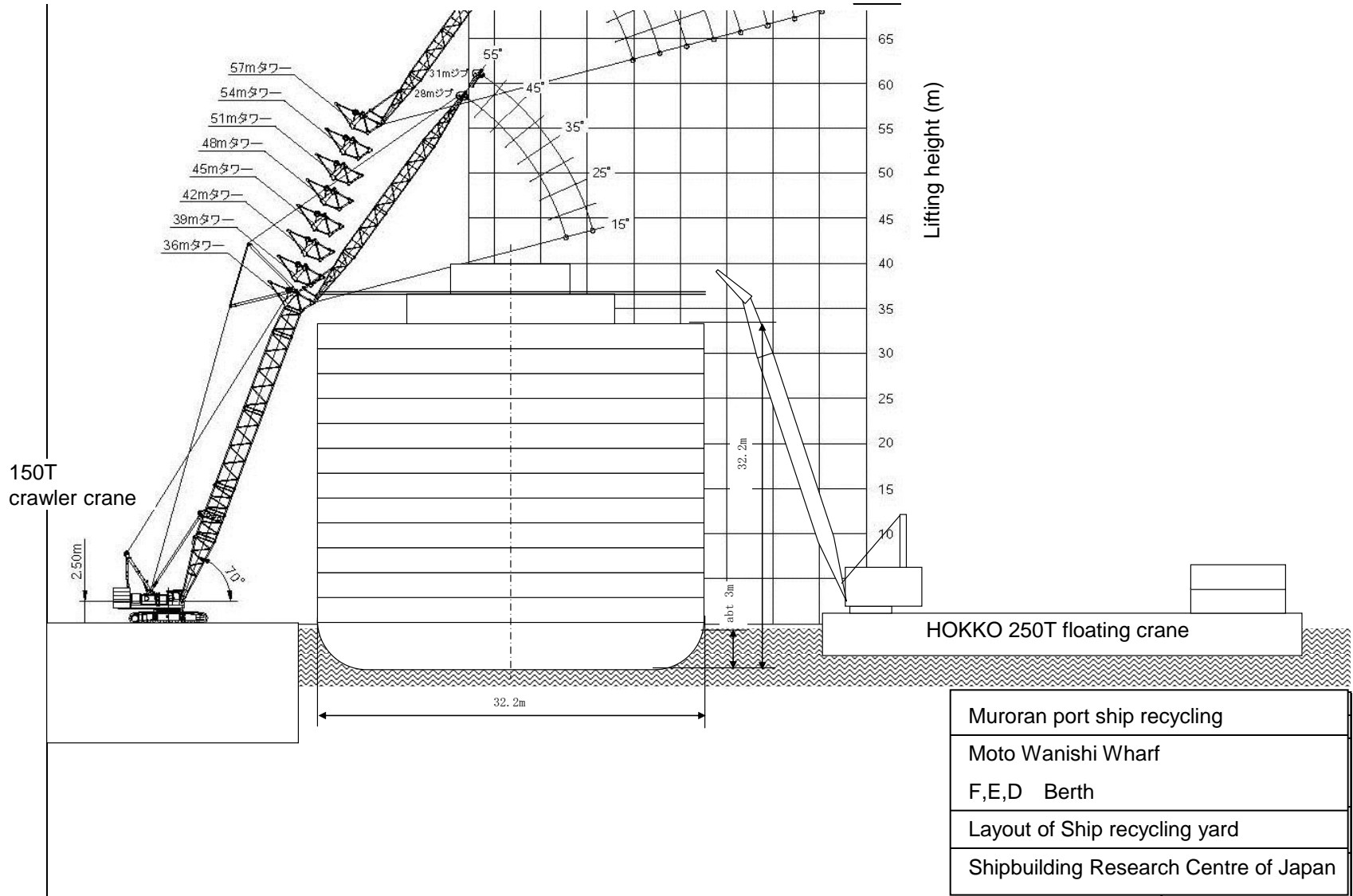
①: Dismantling of upper structure 上部構造物の撤去

②: Dismantling of stern area 船尾物の撤去

③: Dismantling of head area 船首部の撤去

④⑤⑥: Dismantling of center area 中央部の撤去

An advanced afloat ship dismantling plan
 フローティング方式による解体計画



Dismantling method and procedure

Progress of PCC dismantling (removal of funnel)

ファンネルを撤却



Removal of funnel

① lodging area/Interior material removing
居住区・内装材撤去



Remove insulating material manually



insulating material



Gas cutting

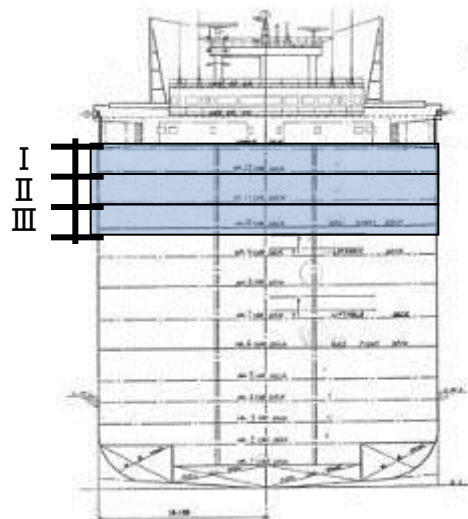


Gas cutting

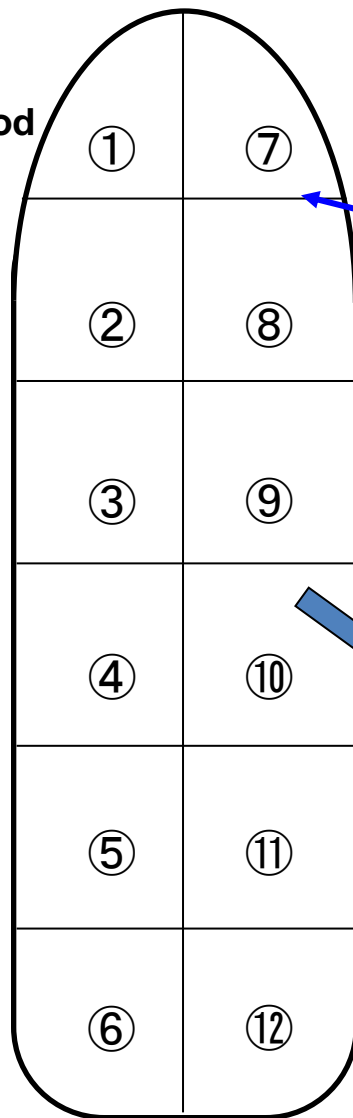
②Upper deck dismantling plan 上部甲板の撤去計画

Cost reduction (improve efficiency)
コスト削減(作業効率の改善)

3 layers simultaneous cutting method
3層切断法



Side view 側面図



Top view 平面図

Automatic welding tools
自動化による作業効率向上



↑Cut the steel sheet preliminarily
by Automatic welding tools
自動溶接機でメシン目のように切れ目を入れる

↓Cut into large size approx. 20ton
船体ブロックを約20tonずつに大バラシ



船体の転倒防止を考慮した
船体ブロックの吊り降ろし



① Pull up and down the 20tons block by crane
約20tonの船体ブロックの吊り降ろし作業



② Turn over the block
船体ブロックの転回



③ Cut to the possible size to load truck
トラックサイズに切断

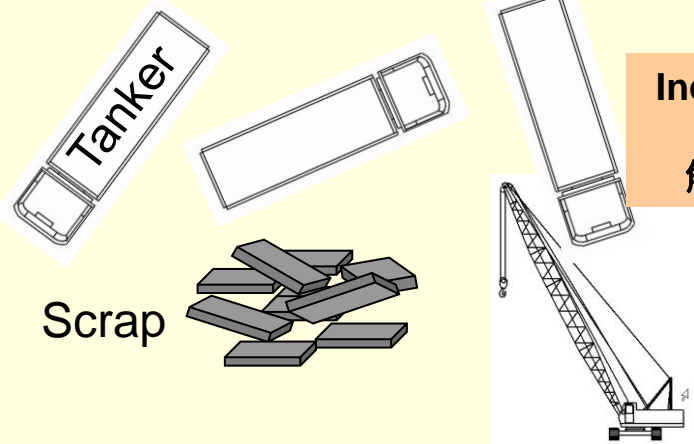


④ shipping to scrap maker
スクラップメーカーに出荷

③ Working Efficiency 作業効率化

At the beginning 当初の積み込み現場

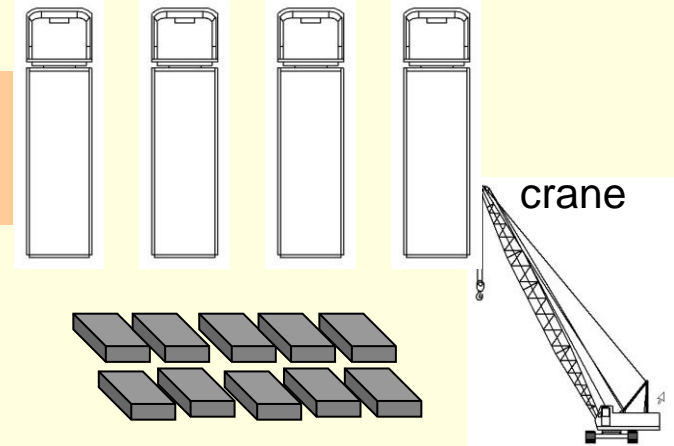
Carry out 搬出 approx. 60tons/day



Increase in quantity of scrap shipping
解体鉄の出荷量増加

At the present 現在の積み込み現場

Carry out approx. 120tons/day



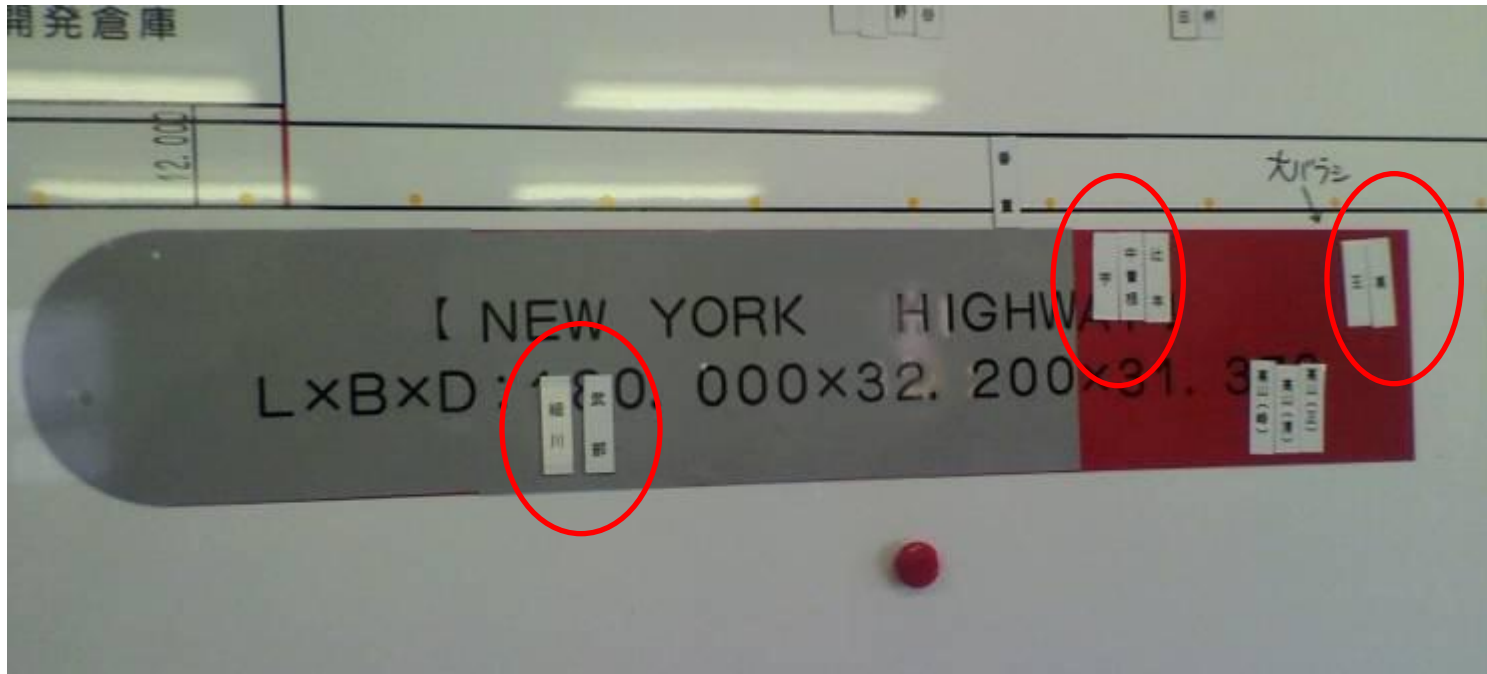
Speedy work
作業効率のスピード化

- Disorder of truck position
トラック位置が乱雑
- Scrap piled up at a place
スクラップ鉄の集積が一箇所

- Fixed truck position
トラック位置を固定
- Scrap placed in order
スクラップ鉄を並べて置く



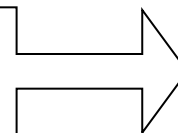
④ An idea of safety dismantling method I 安全な解体手法



Two or more persons working together and safety check each other
2人以上で安全を確認しながらの作業を行う。

Confirm the position of workers from the office on the site
現場事務所内での船体作業者の位置の把握

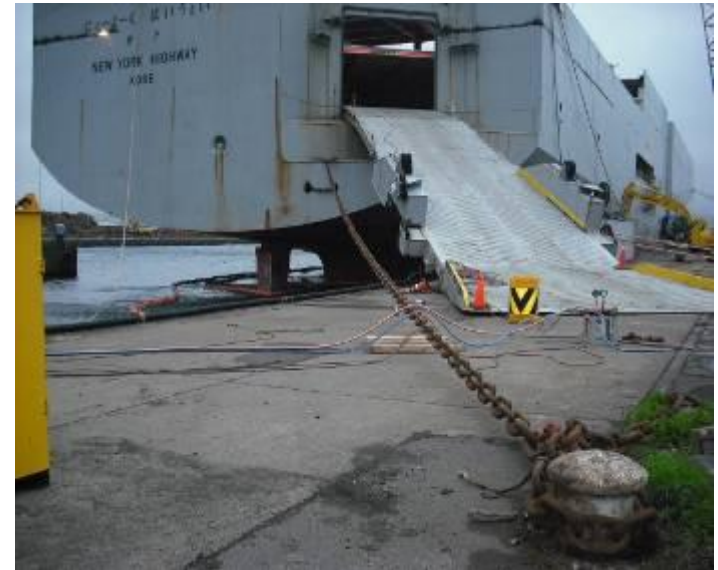
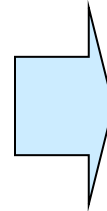
- Confirm the working area 作業箇所を把握
- Confirm the position of worker 作業者の位置確認



Working speed investigation and
Safety check
作業速度調査及び安全確認

An idea of safety dismantling method Ⅱ 安全な解体手法

Change the mooring method of PCC (in 24 May, 2010)
PCC繋留方法変更(5月24日現在)



Change mooring to prevent turn down
and make sure body balance of ship
繋留方法を変更することで、
船体の転倒防止及びバランスを確保する

An idea of safety dismantling method Ⅲ 安全な解体手法



Rope is stretched for preventing falling down at the dangerous areas
危険な場所に転落防止のため、ロープを張る



A cutting method that leave the outer frame to prevent falling down of workers
転落防止のため、手すり部分を残して切断する

PCC dismantling process (on 2 June)
PCC船の解体進捗(平成22年6月2日 現在)



At the Un-dismantled
未解体時



At the present time
現在

Water-jet cutting ウォータージェット切断

Flame cutting

ガス切断

- Ignition accident in fuel tank
燃料タンクへの引火事故
- Hazardous gas
有毒ガスの発生

Water-jet cutting

ウォータージェット切断

- CO₂ decrease CO₂削減
- Water recycling 水の再利用
- No ignition accident 引火防止

Water-jet cutting machine can cut above 30mm thickness steel board by 600MPa hydrostatic pressure.

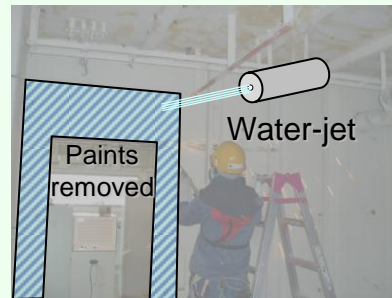
Application of new technology

Example: Paints Removing

Gas by burning paints



Paints removed by water-jet



No gas



Protect workers from hazardous gas

Water-jet cutting machine Report of progress (main body)
ウォータージェット開発機 進捗状況報告(本体部)



Cognitive activity of ship recycling シップリサイクルの認知活動

Commercialization of Ship Recycling

February 27, 2010:
The Hokkaido Shimbun Press

March 8, 2010:
Muroran Minpo Newspaper



Muroran Pilot Model Project, advanced nation type ship recycling system

From 19 to 23, 2010 ship recycle exhibition at Muroran

平成22年4月19日～23日 NHK室蘭 プラザμ シップリサイクル展示会



Poster of funnel ファンネルのポスター



Ship repair tools 船整備工具類



Flags of 150 country or more 国旗



Lifesaving equipments 救命道具

Muroran Pilot Model Project, advanced nation type ship recycling system

On 19 April 2010 (Monday) Inspection of Mrs. Harumi Takahashi Governor of Hokkaido prefecture
平成22年4月19日(月) 北海道知事 高橋はるみ氏 視察



On 6 May 2010 (Thursday) Inspection of Mr. Seishiro Eto, Vice-speaker of The House of Representatives a Diet member/President of Marine promotion league
平成22年5月6日(木) 衆議院副議長 海事振興連盟会長 衛藤征士郎 議員 視察



Muroran Pilot Model Project, advanced nation type ship recycling system

On 21 April 2010 (Wednesday) students of Toya primary school 5, 6 grade
Learning of environment / ship recycle visiting

平成22年4月21日(水) とうや小学校5, 6年生環境学習 シップリサイクル見学



On 25 May 2010 (Tuesday) students of Mizumoto primary school 4 grade
Learning of environment / ship recycle visiting

平成22年5月25日(火) 水元小学校4年生環境学習 シップリサイクル見学



Subject and Prospect in the future 今後の課題と展望

- Execute a safe and environment friendly ship recycling system
安全かつ環境に配慮した解体実験の実施
- Establish a high efficiency ship recycling method
(cost reduction and development of new technology)
高効率な船舶リサイクル方法の確立
(コスト削減、新技術の開発)
- Stabilization of marketing prices of scrap
スクラップ市場価格の安定化
- Rural Revitalization centering ship recycling
(forming a recycling site with cooperation of industry)
シップリサイクルを核とした地方都市の活性化 (企業の連携によるリサイクル拠点の形成)
- Develop Muroran ship recycling model over the country
シップリサイクル室蘭モデルの全国展開

安全でなおかつ環境に優しいシップリサイクルシステムには、まだ壁がたくさんあると思われれます。一つ一つの壁を乗り越えて、先進国型シップリサイクルを室蘭から世界に発信できればと思っております。

Thank you for your kind attention.
ご清聴ありがとうございました。