Technical issues of EEDI regulation to be clarified by ship builders - hydrodynamics point of view -

The 6th Asian Shipbuilding Experts' Forum

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Discussion items

1. Outcome of MEPC64 and remained issues

> ➢ **Procedure for Analysis of Speed Trial**
> ➢ **Procedure for Conduct of Speed Trial**
> ➢ **Minimum power requirement**

2. Present activities by Japan

3. Future Scope

Outcome of MEPC64 and remained issues
Procedure for Analysis of Speed Trial

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> ## <u>Background</u>

> Norway requested to revise the present ISO15016 analysis method referring STA method (2011.4 MEPC62)

> Japan and ITTC proposed to review the analysis method
  and special committee : PSS started their study(2011.12)

> PSS established two drafts (2012.5)
>   - ・ Analysis method -> Include both ISO15016 and STA method
>   - ・Conduct procedure -> STA method could not reach the agreement

> ITTC AC submitted final draft to IMO (2012.6)
>   - ・Only STA method remained by AC person, although Japan and Korea strongly objected
>   - ・Conduct procedure was also submitted without PSS's agreement

> IMO supported the ITTC draft without technical discussion (MEPC64)
  Major part consider only STA method to be included in final document

MARIN JIP
Speed Trial Analysis
Joint Industry Project

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> ## Issue-1

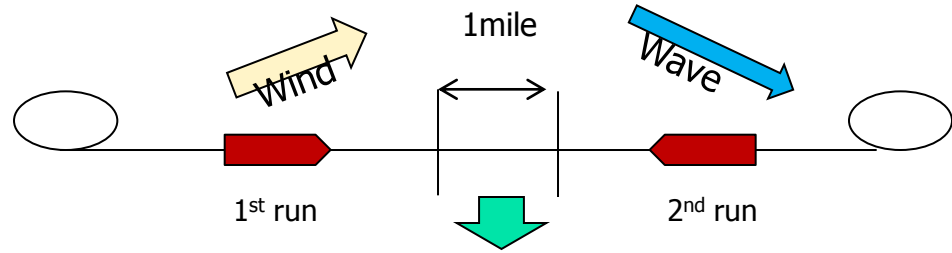## ITTC (STA*) analysis procedure
* MARIN JIP

What is the difference of procedure between ISO15016 and ITTC(STA) method ?

Basic Concept of ISO15016

Wind & Wave : External Force
Current : Only Shift of speed

Measurement

1mile

Wind

Wave

1st run

2nd run

Correction to No Wind, Wave, Current Condition

| 1st Step Vacuum Condition | → | 2nd Step Current Correction | → | 3rd Step No Wind Condition |

Remove the Resistance by relative wind and Wave

Difference of Vs is current

Vs in Vacuum Condition Without current effect

Calculate the power and Speed in vacuum condition base on Prop. Load change

Correction by current curve

Add the Air Resistance by own speed

Vs-vacuum(1st run)
Vs-vacuum(2nd run)

Calculate the power and Speed in No Wind condition

1st run

2nd run

Basic Concept of ITTC(STA) Method

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<div style="border: 1px solid red">Direct Power Method</div>

Calculate the resistance by relative wind and own speed: R_{AA}
Calculate the resistance increase in wave : R_{AW}

$$\Delta R = R_{AA} + R_{AW}$$

$$\Delta R_{AA} = \Delta R(V_s) - \Delta R(V\text{-relative})$$

Calculate the change of power due to ΔR using propulsive efficiency (ηD), transmission efficiency (ηs) and ship speed

$$\Delta P = \frac{\Delta R V_s}{\eta_S \eta_D}$$

Correct the power directly using ΔP
Ship speed is identical to measured value

$$P_{SC} = P_{SM} + \Delta P$$

Issues to be clarified

➢ Sole method suddenly set. Still black box and accuracy is not evaluated in ITTC
   Details are not explained in the latest ITTC procedure

➢ Direct power correction without current correction

   Because current effect can be eliminated by multiple double run
   Is it correct ??

➢ Influence by difference of propeller load for each run taken into account ??
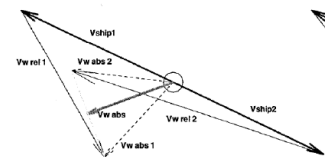
Vs still includes the effect of disturbance

Outcome of MEPC64 and remained issues
Procedure for Conduct of Speed Trial

➢ **Issue-2**

Procedure for conduct of Speed trial

- ➢ Two double runs to eliminate the effect of current
  Re-trial should be done when strong current exists

- ➢ Over 10minutes measurement is required

- ➢ Absolute wind velocity and direction should be
  averaged using two opposite runs

What happens if the above items are adopted ??

Outcome of MEPC64 and remained issues
Procedure for Conduct of Speed Trial

Issues to be clarified

Two double run

- ✓ Again, current effect can be eliminated ?
- ✓ In case of VLCC trial with 4 set of M/E output, trial time would be 24 hours

Re-trial should be done when strong current exists

- ✓ Strong current exist in any place
- ✓ Who can know the current speed during trial though STA method does not conduct current correction ?

10 minutes measurement

- ✓ Trial site will be a coastal area or inside the bay to avoid the strong disturbance
- ✓ Many vessel , e.g.. Fishery boat exists. Keeping the heading for long time is dangerous
- ✓ Running distance is not sufficient

Average of Absolute wind data using two opposite runs

- ✓ What is the physical meaning ?
- ✓ Korea and Japan strongly insisted that the wind speed and direction changes depending on time as common sense. However this comment was neglected.

Common Trial Site : Suruga Bay

Out side the bay
・Traffic is congested
・Strong current exists (e.g. spring tide)

Outcome of MEPC64 and remained issues
## Minimum Power requirement

Back ground

➢ IACS established the guideline for minimum power requirement
    to prevent the excessively low powered vessel from safety point of view

➢ Draft was submitted to MEPC64 and comments from CG
    (Corresponding group) are requested now.

➢ Two Levels are established for the evaluation during the term of phase-0
    If level-1 is not satisfied, Level-2 shall be confirmed.

Basic Concept of Minimum Power Requirement

Level-1: Minimum power line based on existing ship's data
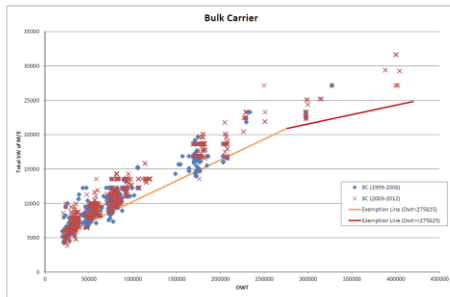
Requirement

 M/E power should be larger than exemption line

✓ Level-1 is already severe for some existing vessel especially large BC and will be very tough target for all type of vessel in phase-2 and phase-3.
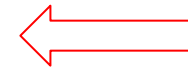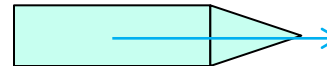
Contradict to the future reduction of EEDI by technical progress.   This requirement should be revised, otherwise we can not construct a vessel.

Level-2 : Simplified assessment

Beaufort 8

Wave Height : 6 m
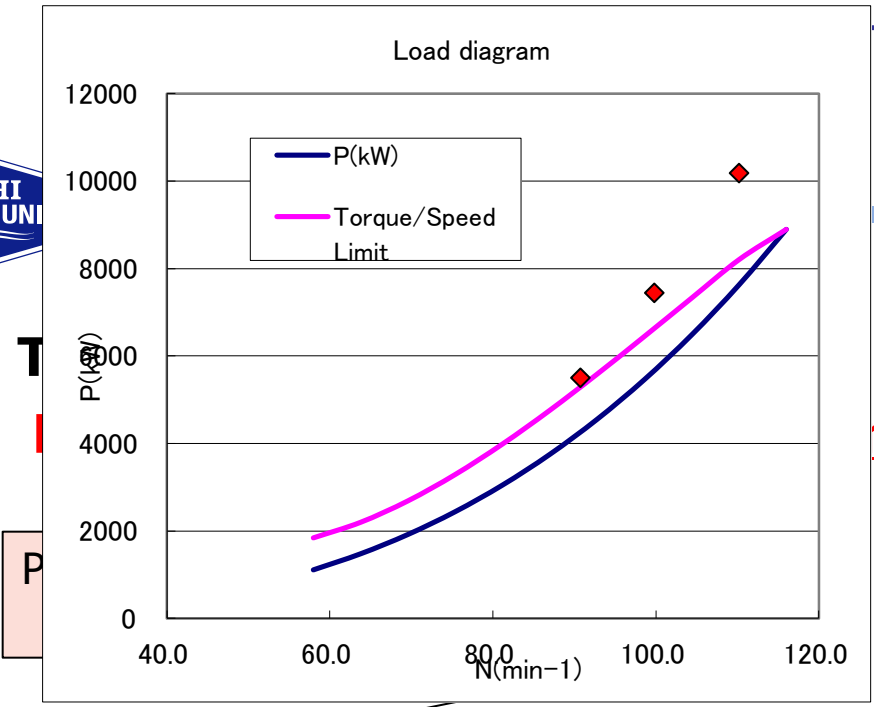Wave Period =8 to 15 sec
Wind velocity =19m/sec

Advance Speed

Head Wave and Wind

Requirement
 Certain advance speed should be kept within M/E torque Limit

✓ All the small vessel e.g. PMX B/C can not fulfill this requirement because the same wave height as a large vessel is used.

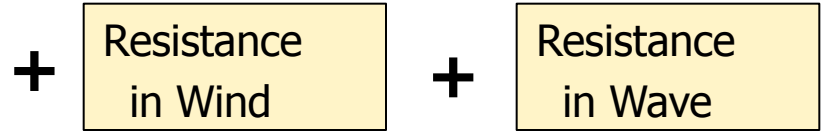✓ In case of large vessel, Level-2 is a tough target when entered phase-2 and 3

·**Present vessel could not satisfy although they are all safely operated**
· **This requirement prevent our future effort to attain EEDI in phase 2 and 3**

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Load diagram

Wave Height is 6 m	
Peak Period	Force
8 Sec	50.8 ton
15 Sec	80.5 ton
19 Sec	63.2 ton

+ Resistance in Wind + Resistance in Wave

4.8 ton   13.1 ton

・The Effect of wave is large !
・Adverse condition should
　be re-considered !
・Again fact is that this vessel
　is safely operated for long time

Present activities by Japan

➢ **Procedure for Analysis and Conduct of Speed Trial**

✓ Japan started to revise the ISO15016 as a convener and 1st international expert meeting was held on this September.

Korea: Dr. Myung-Soo Shin (MOERI)

China: Mr. Zhao Xiaoming (TNIRI) -> absence

Another participant country: USA and Portugal

✓ SAJ collected the trial data to clarify the problematic point and submitted to ITTC PSS.

✓ Evaluation for STA Procedure is started based on the trial data.

-> Korean shipyards are also carrying out the examination

➢ **Minimum Power Requirement**

✓ SAJ evaluated the present method and replied as CG1 comments

✓ Further evaluation are undertaken now to make further comment to CG2

THE SHIPBUILDERS' ASSOCIATION OF JAPAN

➢ **Applied ISO and STA method to 2 sister ships (VLCC)**

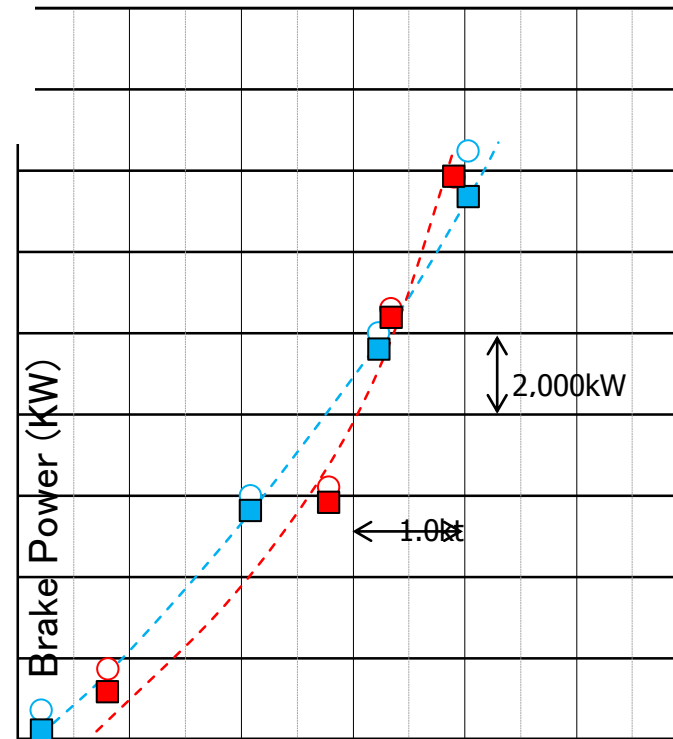○ : **Measured Value** for **Ship-A** and **Ship-B**

Correction by STA scatters,

.The effect of current ?

·Correction to Vacuum ?

Examination is necessary !

STA METHOD

Brake Power (KW)

2,000kW

← 1.0kt

Vs in knots

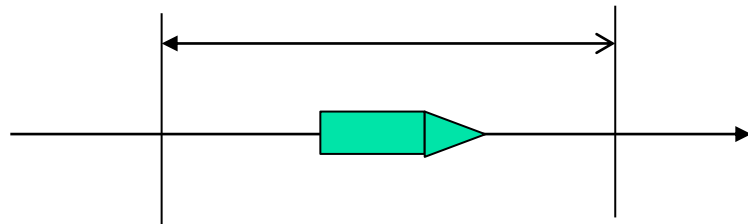Brake Power (KW)

2,000kW

← 1.0kt

Vs in knots
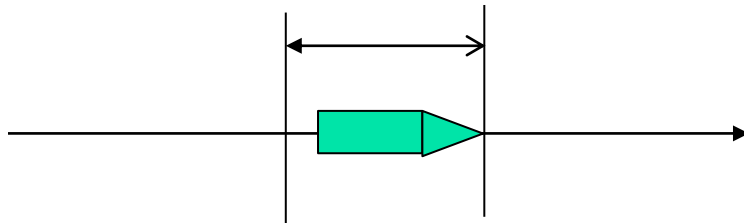
13
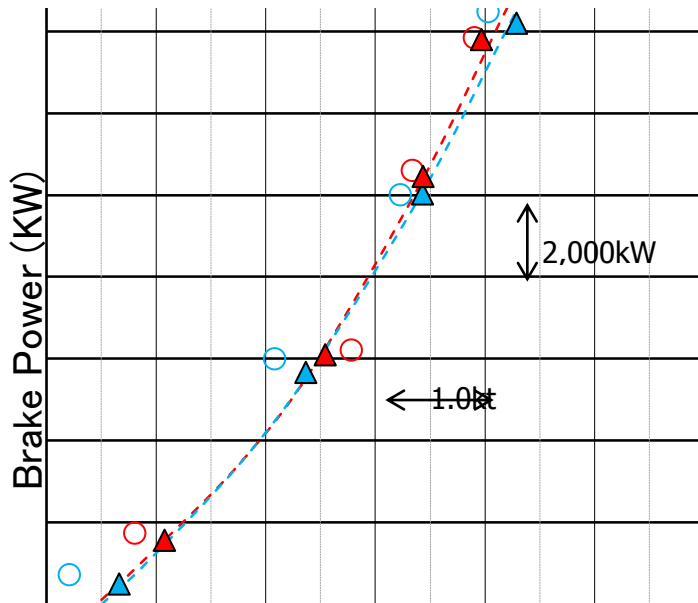
Present activities by Japan
- Example 2 -

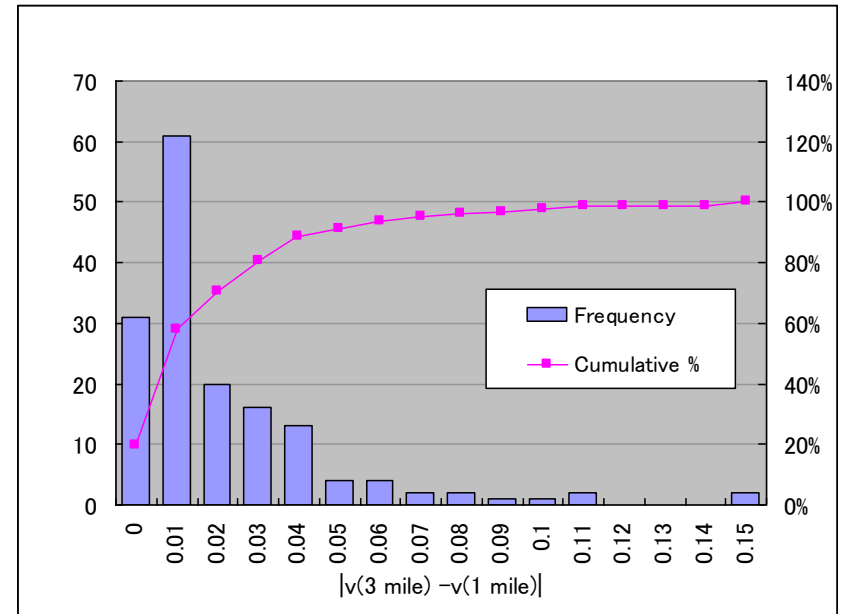➤ **10 minutes measurement is necessary ?**

Average speed during 3 mile run
(10 minutes)

Difference

Average speed during 1 mile run
(around 3min)

SAJ Trial DATA (159 runs)

Difference of Speed is very small !
0.05 kts for over 95%

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Future Scope

➢ Procedures for analysis and conduct of speed trial, minimum power requirement seems to be problematic from practical point of view

➢ We ASEF members construct an enormous proportion of vessels allover the world. Accumulated our experience should be reflected to amend the present procedures more realistic. Otherwise, the member of ASEF would face great difficulties by these problems

➢ We should keep in mind that ASEF shipbuilders are now standing on a destructive position for remained issues

➢ Present procedures would be automatically certified by the initiative of EU community as it is if any actions are not executed by Asian side

➢ Please submit any comments and data to breakthrough the present situation at IMO, ISO and ITTC   Time is quite limited until next May

  Close ties between us is necessary !!!

Thank you for your attention !

고맙습니다

真谢谢你了

有難うございました