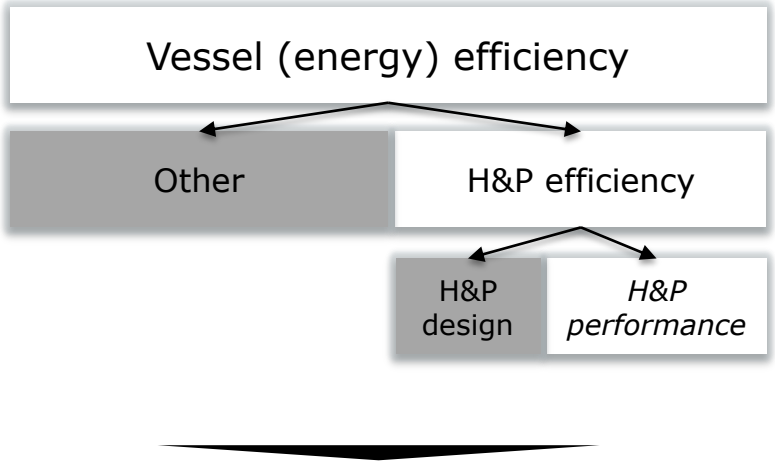
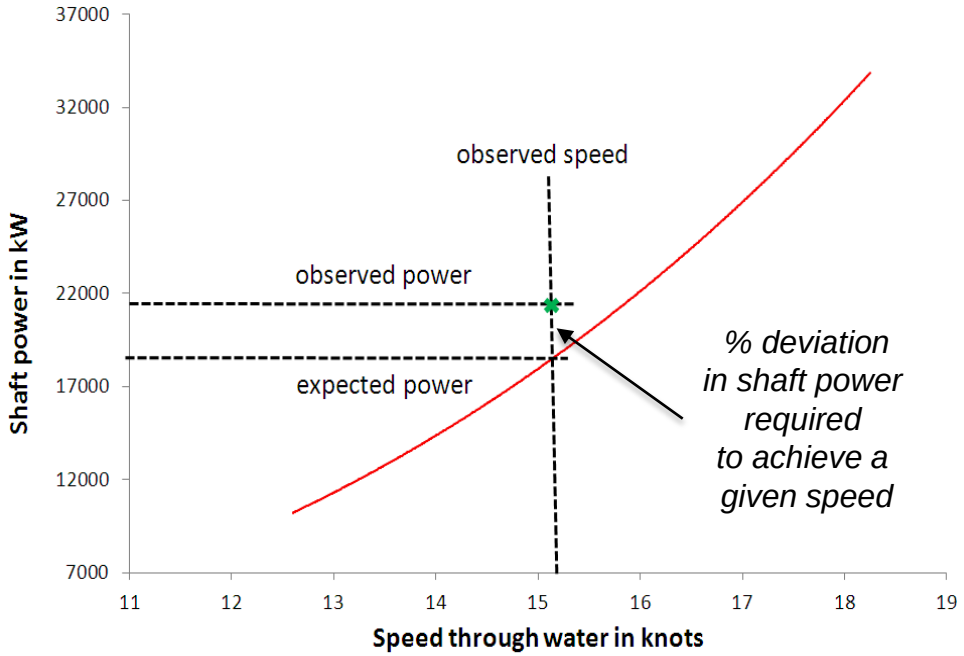
Jotun Hull Performance Measurement Method (JHPMM)

Measurement of Hull & Propeller Performance

Presentation to stakeholders at London Workshop
London, 09.05.2013

1. Measurability (cont.): Measuring changes in the efficiency of a vessel's underwater hull over time.





How much more (or less) power is required to achieve a given speed attributable to changes to the condition of the hull and propeller over time?

- given unchanged hull and propeller design

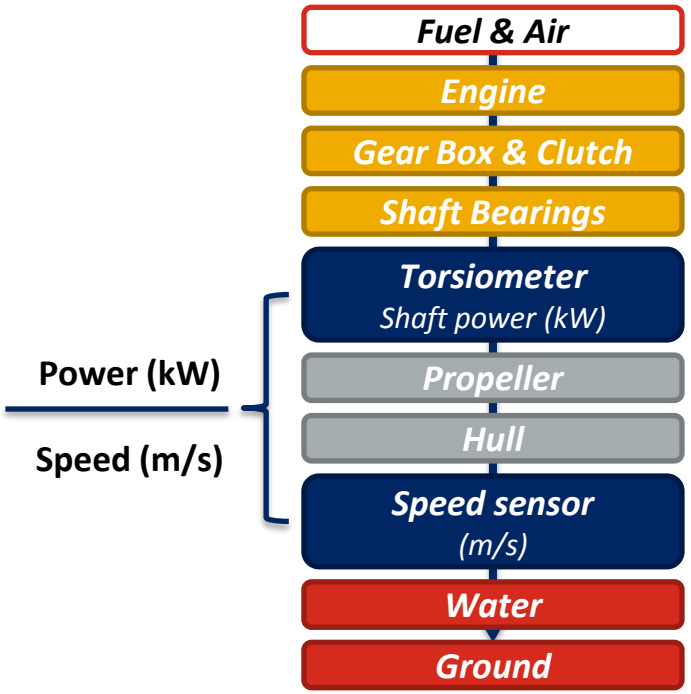
1. Measurability (cont.): JHPMM methodology overview.

- Isolate Hull & Propeller Performance by tracking changes in the relationship between shaft power and speed through water over time.
  - not yet possible to separate hull from propeller performance so as part of performance based contract we take on responsibility for both.

- Long-trend approach to dealing with measurement noise:
  - track % deviation from vessel specific speed-power curve every 10 to 15 seconds over the full lifetime of the system (~ 2.5 million data-points per year)
  - normalize for draft
  - filter for bad weather and < 50% power

- Fully automated data logging (raw data) and data transfer.
  - vendor neutral
  - regular assessment of sensor correlation

Vessel engine train and measurement points for Hull & Propeller Performance.



1. Measurability (cont.): JHPMM v2 infrastructure requirements.

Data logging unit

GPS

Aft draft sensor

+

Doppler log ±1 % (1σ)

+

Fwd draft sensor

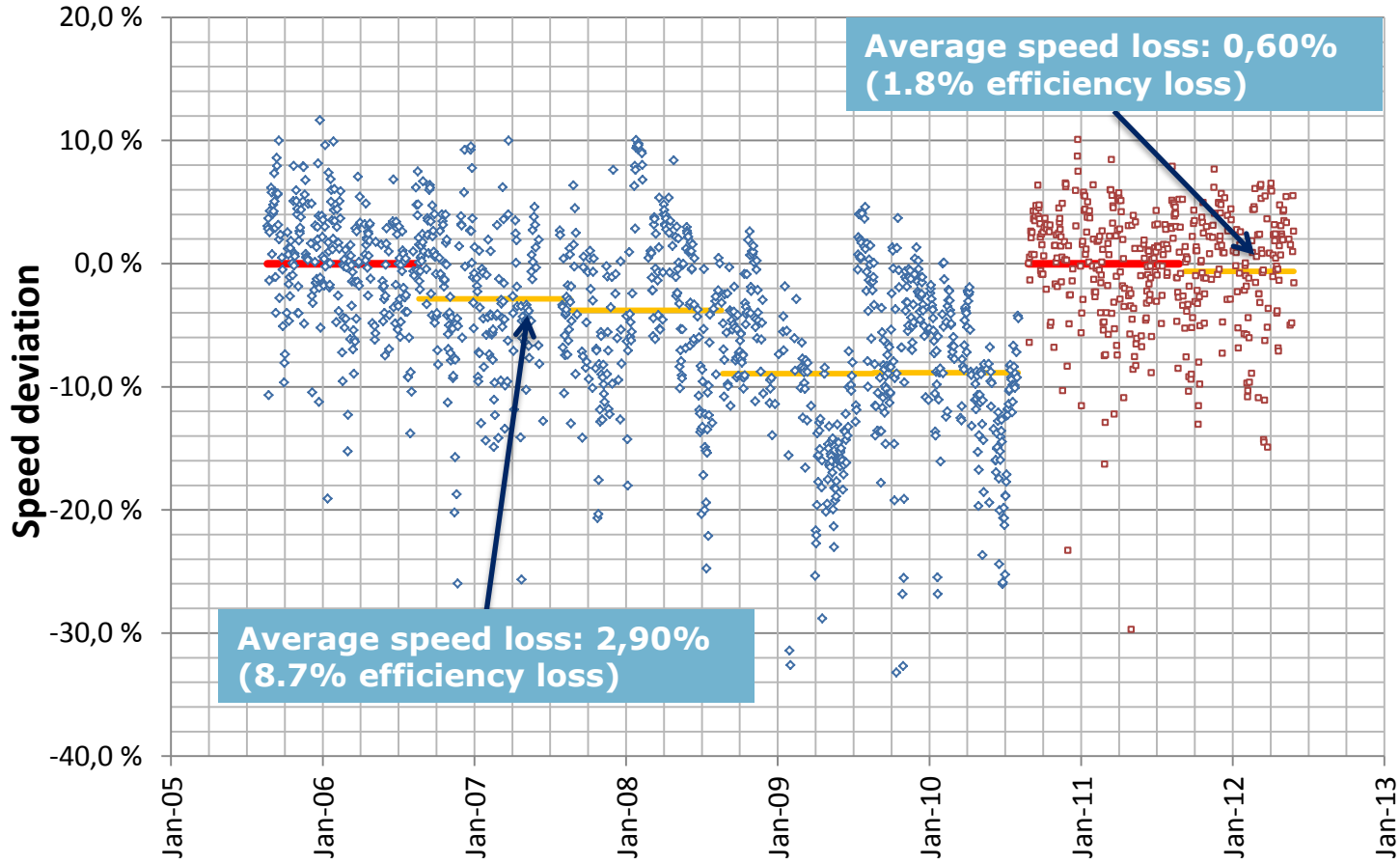
+

Shaft Power and RPM ±0.5 % (1σ) ±0.1 % (1σ)

+

Anemometer

3. Delivery (cont.): Real-life example – 51,000 dwt bulk carrier

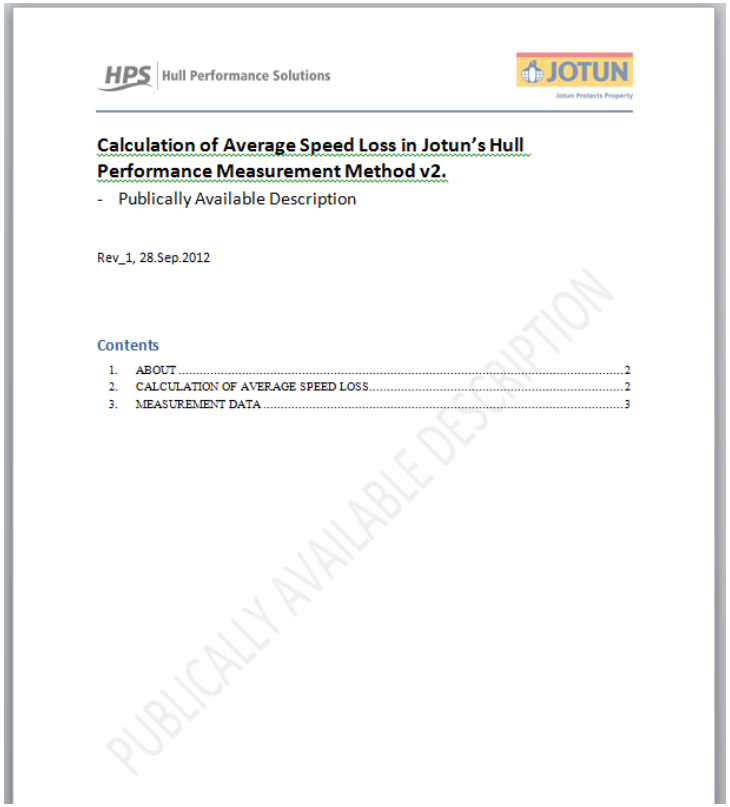


1. Measurability (cont.): Methodology overview.

- Comprehensive 3rd party review of methodology, including underlying assumptions, will be completed later this month.
  - Based on actual raw data (takes time to secure!)
  - Expected conclusion: fit for purpose (given set-up in Performance Guarantee), room for further improvement
  - Preceded by 2 less comprehensive and more theoretical reviews

- Fully transparent and published under CC license:
  - Supported by several SPM systems (Kyma, Marorka, MSS, ST) with more in the pipeline.
  - Parties to the contract, or appointed 3rd parties, can replicate analysis given access to the raw data

- Agreed upon for use in performance based contracts on >50 ships.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JOTUN
Jotun Protects Property

Calculation of Average Speed Loss in Jotun's Hull Performance Measurement Method v2.

- Publically Available Description

Rev_1, 28.Sep.2012

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PUBLICALLY AVAILABLE DESCRIPTION

JOTUN