

Ship Energy Performance Framework

Case Study: Post-retrofit Impact Assessment of an LPG Tanker

Tier 4: Improvement Evaluation



Case

During drydocking, a liquefied petroleum gas (LPG) tanker was fitted with a duct and premium coatings to improve propulsive efficiency before returning to service. The ship manager asked ABS to evaluate the resulting performance improvement using high-frequency measurements collected since the previous drydock.

Methodology

ABS processed high-frequency sensor measurements from two periods with similar hull, propeller and main engine conditions: post-drydocking Period 1 and post-drydocking Period 2 when the improvements were implemented.

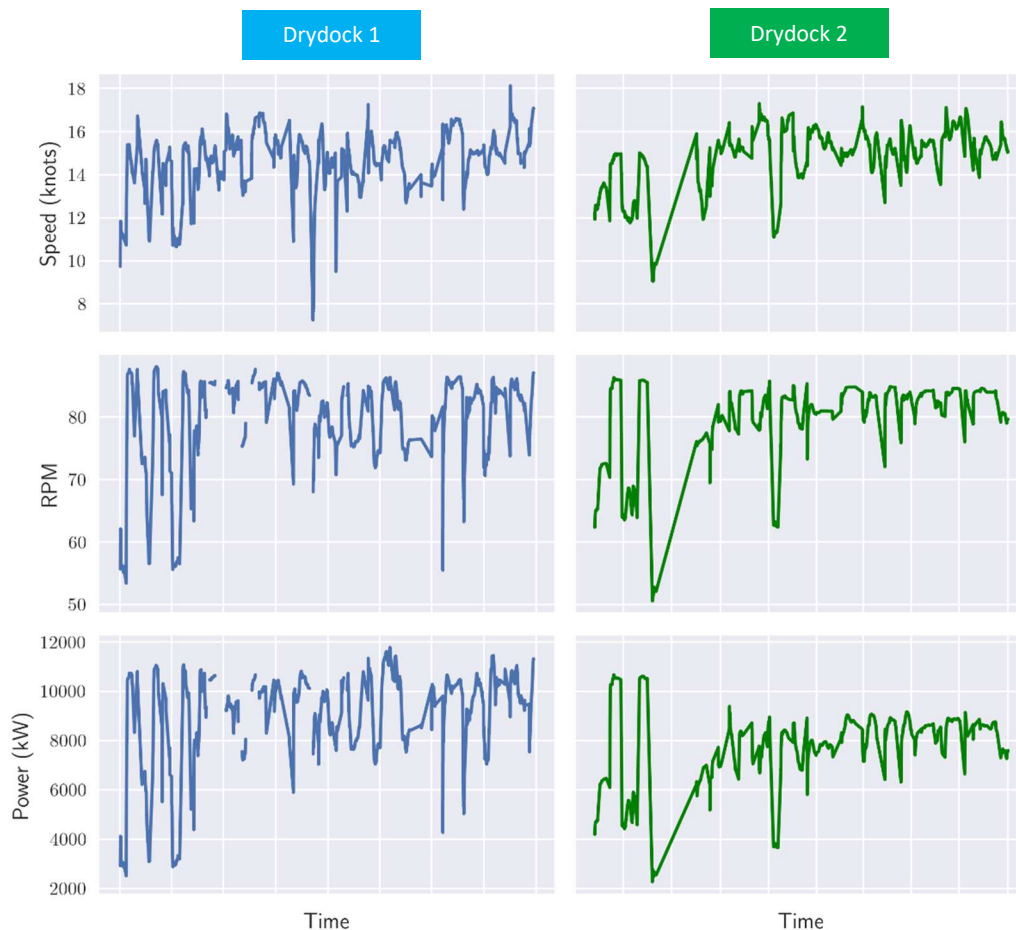


Figure 1: Time series of vessel performance-related quantities.

The sensor measurements were compared with predictions from a computational vessel performance model. The deviation from the model predictions indicates the effects of the improvement measures implemented during drydocking.

Deliverables

ABS delivered a report that presents the processed measurements, details of the computational vessel performance model and a statistical analysis comparing the vessel's actual performance with the reference model.

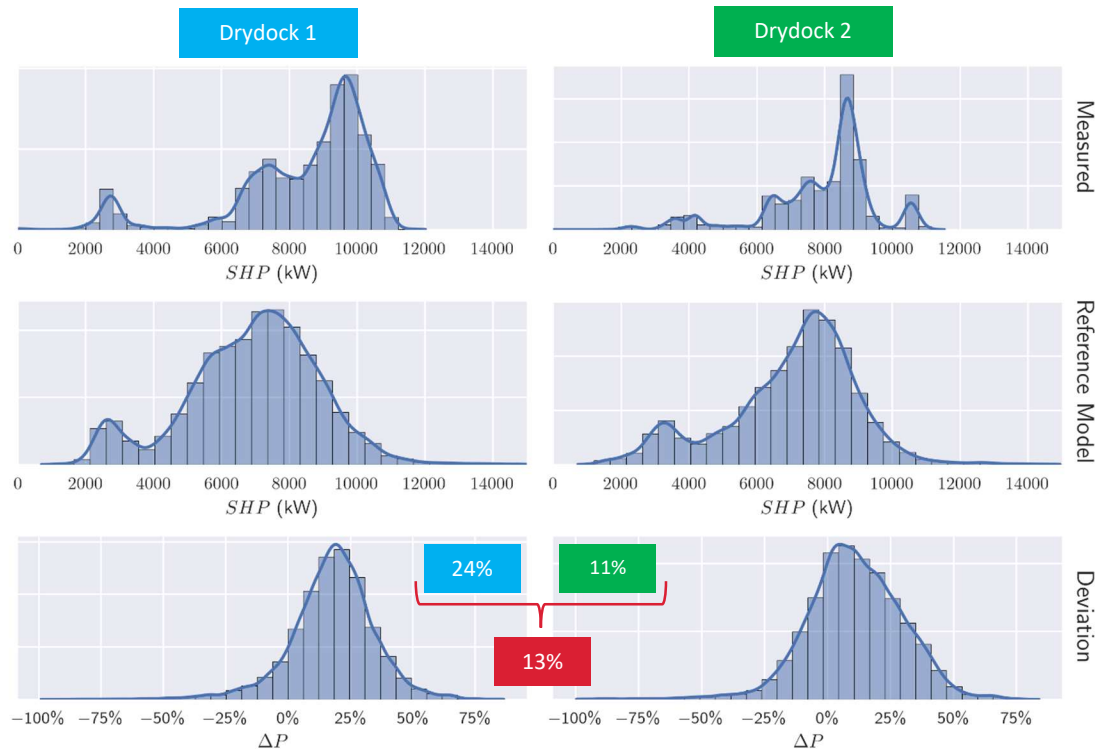


Figure 2: Distributions of measured power, reference-model power predictions and their relative deviation. The deviation distribution is important for assessing energy-saving devices.

Conclusion and Recommendations

- After retrofit measures are implemented, their expected performance improvements should be evaluated under actual operating conditions. This evaluation gives stakeholders a more reliable basis for assessing retrofit investments than design assumptions or unverified performance figures.
- Post-retrofit performance should be assessed against a credible vessel performance baseline because design intent alone cannot confirm the benefits.
- High-frequency measurements combined with a computational reference model provide a basis for quantifying the actual in-service benefits achieved after drydocking.
- This analysis helps operators determine whether retrofit measures improved propulsion efficiency and reduced fuel consumption under actual operating conditions.
- Post-implementation verification supports future retrofit investment decisions and can help - stakeholders identify comparable opportunities across the fleet.
- Ideally, ABS should be engaged before the retrofit to provide guidance on the operational data needed to compare performance over short- and long-term periods. Evaluating multiple periods can identify lasting effects because some benefits may degrade over time.

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