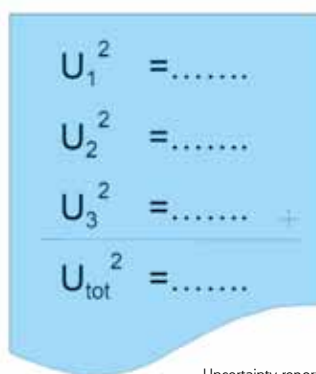


Quantifying quality

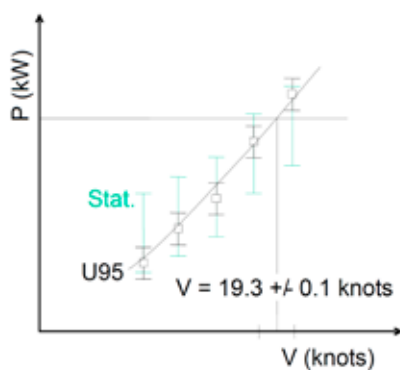
MARIN is working to provide measurement results with a specified confidence interval. Report outlines the reasons why “quantifying confidence” is so important.



Uncertainty report

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As many readers know, there is a limit to the accuracy of full-scale predictions based on model scale measurements. For example, a statement that a ship is predicted to sail at 19.2743 knots at 85% MCR would be rather ridiculous. A better approach is to perform an uncertainty analysis. Here, uncertainties from sources such as the calibration of the transducers, reproducibility of the model test, analysis procedure and extrapolation method are summed quadratically. Consequently, in this instance, the predicted speed is 19.3 ± 0.1 knots, with a confidence level of 95%. In other words: MARIN is 95% confident that the speed will be between 19.2 and 19.4 knots.



Future speed power diagram

Uncertainty assessment Calibration of force transducers is automated and together with the calibration constant, calibration delivers uncertainty levels according to international standards. Reproducibility of model test results is investigated using a reference ship model that is towed on a regular basis. Similar efforts are made in

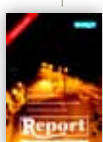
the fields of manoeuvring and seakeeping. MARIN's Trials and Monitoring Department closes the loop by assessing the uncertainty of full-scale measurements.

$$U_{\text{correlation}}^2 = U_{\text{model tests}}^2 + U_{\text{extrapolation}}^2 + U_{\text{full scale}}^2$$

CFD validation is taken very seriously at MARIN. As the uncertainty of CFD calculations decrease, more carefully designed experimental results with a well-documented uncertainty analysis are required.

ISO 17025 accreditation The International Towing Tank Conference (ITTC) has provided many procedures to assess the measurement uncertainty of towing tank results. However, measurement uncertainty is still a largely self-acclaimed value. To enhance its independent character MARIN therefore aims to acquire ISO 17025 accreditation. MARIN was awarded the ISO 9001 several years ago but while ISO 9001 focuses on a general quality management system, ISO 17025 adds an independent review of the technical capabilities on calibration and model testing. ▢

2003



Report special
on LNG

2003



Monitoring Marco Polo TLP
in 1300 m water