



The new dimension  
of propellers

A member of  
**DIHAG**  
HOLDING



The new benchmark  
for propellers

## efficiency-by-mmg.de

Ship propellers from MMG have been setting standards for more than 65 years in terms of size, quality and efficiency. The key to our success are individually produced propellers which are in perfect alignment with the vessel type, the engine and the operating profile.

The »Efficiency by MMG« label denotes a new generation of propellers, which produce powerful propulsion, save valuable resources, lower costs and reduce CO<sub>2</sub> emissions. That's why »Efficiency by MMG« is also a response to the increasing demands for environmental protection in shipping. Our goal: to make the shipping of today and tomorrow as sustainable and efficient as possible. Our entire business model is oriented around this target – from research over manufacturing up to the final assembly.



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# Digital technologies for the highest quality and efficiency.

Secure a clear competitive edge in maritime trade – save up to 14 % in fuel with digitally optimised 5D Propulsion from MMG.

MMG is setting new standards in the field of high-efficiency propeller drives with the innovative »5D Propulsion« concept. The key to success is the highest precision: by using five innovative digital technologies we guarantee design quality and production accuracy for our products that are unique worldwide.

The result: an unrivalled high level of efficiency and a fuel saving of up to 14 percent.



Many ship owners are re-defining their requirements against a background of rising fuel prices. Efficiency becomes particularly important for slow steaming.

The »Efficiency by MMG« label denotes a new generation of products, which produce powerful propulsion, save valuable resources, lower costs and reduce CO<sub>2</sub> emissions.

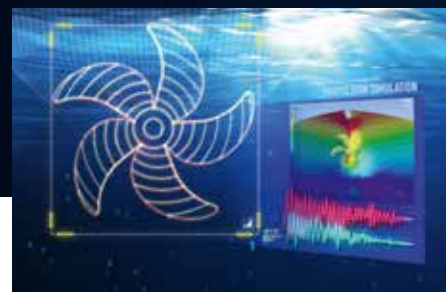


## 5D MDC

Multidata Design Concept

Individual propellers in perfect alignment with the ship's operating profile are our response to the increasing economic and environmental challenges in shipping.

MMG no longer limits propeller design to the standard parameters such as the hull, engine and rudder, but also includes load, draught, drift angle, running speed, current, wind and swell on the planned route. Classic calculation methods cannot cope with these requirements. However, MMG has developed an innovative algorithm in collaboration with the Hamburg University of Technology (TUHH), which enables us to incorporate 2,000 operating points. And we are the only propeller manufacturer in the world with this capacity. We can achieve unprecedented design quality thanks to this innovation.

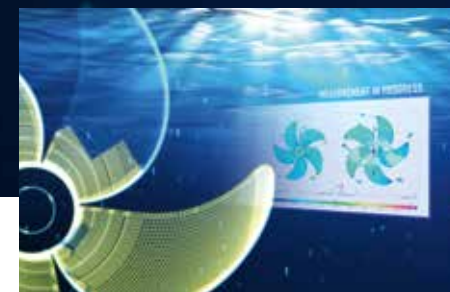


## 5D NPS

Numerical Propulsion Simulation

MMG developed Numerical Propulsion Simulation (NPS) to increase the design accuracy by obtaining the hull-propeller interactions directly.

This unique technology means we can quickly and cheaply compare alternative propeller designs as often as we like already at an early development stage of the project. Like in a model test we can run the propeller designs at different vessel speeds under different loading conditions looking for the most efficient configuration. This is how we find the most efficient solution for the ship owner's requirements. Classic model tests performed at ship model basins confirm the NPS results.

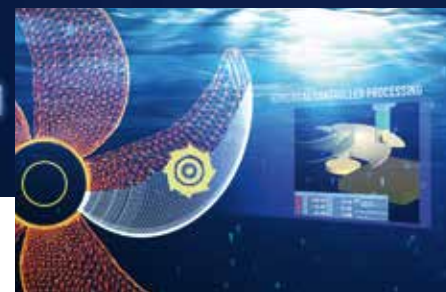


## 5D OPM

Optical Precision Measurement

Whether the potentials of the propeller design can be exploited depends largely on the technological implementation. Using Optical Precision Measurement (OPM) MMG guarantees the highest design accuracy in all dimensions.

The propeller is scanned with an accuracy of up to 1/100 mm – from the cast blank to the final grinding – using fringe pattern projection and an optical sensor. The propeller is only awarded the »Efficiency by MMG« certificate when the results of the OPM are in perfect alignment with the design geometry from the Multidata Design Concept. So we guarantee that our propeller will achieve the calculated and predicted performance in full scale on all oceans.



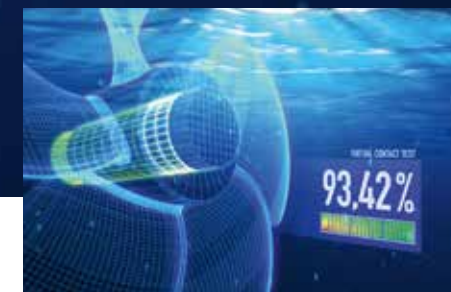
## 5D NCP

Numerical Controlled Processing

MMG relies on Numerical Controlled Processing (NCP) for highly accurate machining used at all stages of production.

NCP involve all numerical processes MMG propeller passing through during construction and manufacturing. With the most accurate free formed surfaces using modern CAD software the basis is set for all geometrical evaluation – whether for best fit algorithm just after casting, as a basis for CAM works or as a rule for the final quality check.

This ensures that MMG's design quality can be kept during all necessary processes in order to give the propellers best efficiency even in full scale.



## 5D VCT

Virtual Contact Test

MMG has developed the Virtual Contact Test (VCT) to reduce expenditure on propeller assembly. With VCT the conical hub bore of the new propeller is measured precisely down to a hundredth of a millimetre and aligned with the design data of the existing shaft while still in the MMG works. The propeller is supplied ready for fitting. The MMG engineers will test the dimensions of the ship's shaft using a mobile measuring unit if required.

The VCT, which is recognised by the leading classification societies, makes the traditional spot check fully superfluous – in both redesign programmes and on new ships.



MMG escap<sup>®</sup>  
energy saving cap

MMG espac<sup>™</sup>  
energy saving package

MMG espro  
energy saving propeller

MMG redesign  
redesign programme

More information at  
[efficiency-by-mmg.de](http://efficiency-by-mmg.de)