5TH
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ANNIVERSARY

ENERGY EFFICIENCY TECHNOLOGY

S-OptPro ǀ S-Profit ǀ S-Cap ǀ K-VG ǀ CFD

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SILLAMETAL

S-OptPro
Technology for Optimizing Propeller

◖● Advanced Propeller Optimization for Maximum Efficiency

SILLAMETAL's S-OptPro combines over 50 years of expertise in marine propulsion with cutting-edge hydrodynamic design. By incorporating vessel-specific parameters—such as service speed, load conditions, fouling, and actual sea states (currents and waves)—S-OptPro delivers propellers precisely tailored for optimal performance.

✿ Key Features

Data-Driven Design

Utilizing full-scale CFD hull-propeller interaction analyses, enabling the evaluation of multiple design alternatives early in the design phase to ensure accurate performance predictions.

Precision Realized

Advanced manufacturing capabilities and strict quality control ensure that the hydrodynamic benefits of the designed propeller are fully realized, maximizing energy efficiency and contributing to CO_2-emission reduction efforts.

Regulatory Compliance

Optimized hydrodynamic performance helps shipowners confidently meet evolving global and local standards, including EEDI/EEXI, CII, and EU ETS.

✿ S-OptPro Highlights

With S-OptPro, shipowners secure propulsion solutions that not only maximize efficiency but also sustain long-term operational integrity-ensuring vessels remain both compliant and competitive in an increasingly demanding maritime environment.
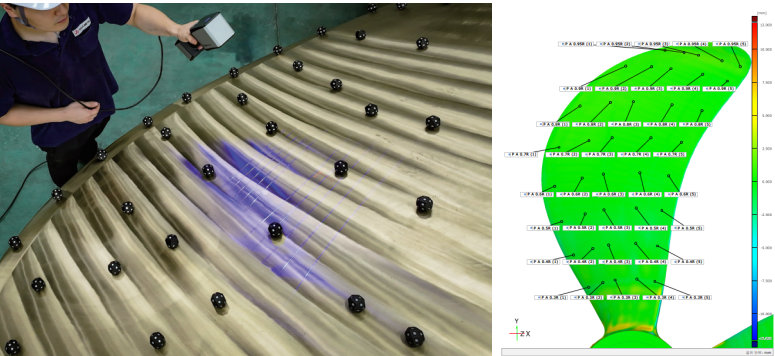
Precision Measurement of Propeller Geometry Using 3D Scanning

Redesigned Propeller & S-CAP

CONTENTS

△ SILLAMETAL

S-ProFit
Propeller-Retrofit Solution

◖● Proven Retrofit Solution for Enhanced Efficiency

S-ProFit is a verified propeller retrofit solution that improves propulsion performance for existing vessels while simultaneously reducing fuel consumption and CO_2 emissions-economically and effectively. When existing propellers no longer match the vessel's operating conditions-due to slow steaming and tightened environmental regulations-S-ProFit enables enhancements in propulsion efficiency alongside improvements in cavitation and vibration performance. It also optimizes overall propulsive efficiency by accounting for flow interactions with already-installed Energy Saving Devices (ESDs).

Key Features

Cost Efficiency
- Maximize asset recovery by selling the existing propeller as scrap
- Manufacturing cost savings by optimizing the weight of the new propeller
- Shorter installation time

EP* Design Quality
Assessment of performance quality for the Existing Propeller
- Provides insights to improve efficiency
- EP : Existing Propeller

Engine Power Limit
- Optimize the propeller redesign based on actual operational data to maximize efficiency
- Optimization of blade number, diameter, blade area ratio, thickness

Design Capability
- Advanced optimization design tech.
- High-level CFD simulations to capture detailed flow dynamics, optimize blade performance, and minimize cavitation risks.
- Structural design & analysis

Scope of Supply

01 High-precision production and strict quality control

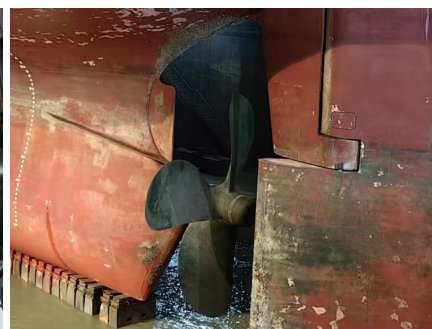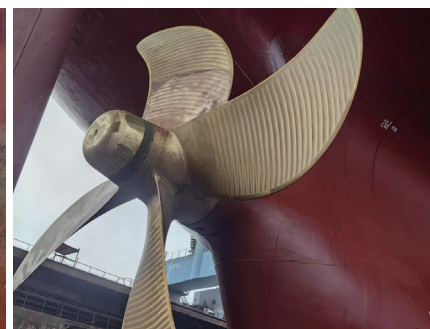**02** Class-compliant design and documentation

03 Expert on-site installation & alignment

Blue Fitting Test

Existing Propeller
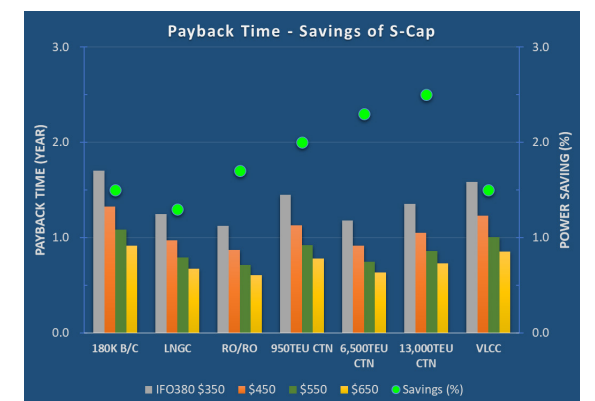
Retrofitted Propeller

S-Cap
Propeller Cap with Fins

◖● Efficient Propeller Cap

S-Cap is an energy-saving device designed to reduce hub vortex formation and recovery pressure behind the propeller.

Key Features & Benefits

01 Fuel savings: Up to 3%

02 Performance: Reduced risk of rudder erosion, propeller noise, and vibration

03 Practicality: Simple installation at lower cost than comparable ESDs

04 Quick ROI: Achieves fuel savings within 1.5 years

Payback Time - Savings of S-Cap
PAYBACK TIME (YEAR) / POWER SAVING (%)
180K B/C, LNGC, RO/RO, 950TEU CTN, 6,500TEU CTN, 13,000TEU CTN, VLCC
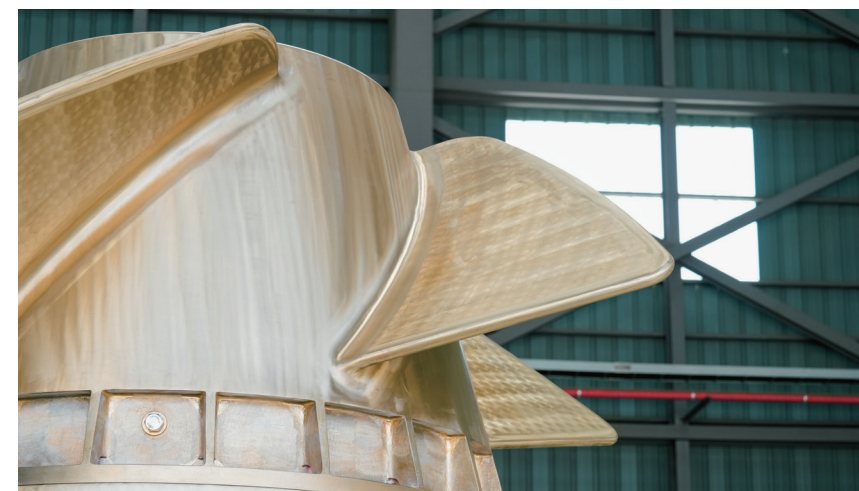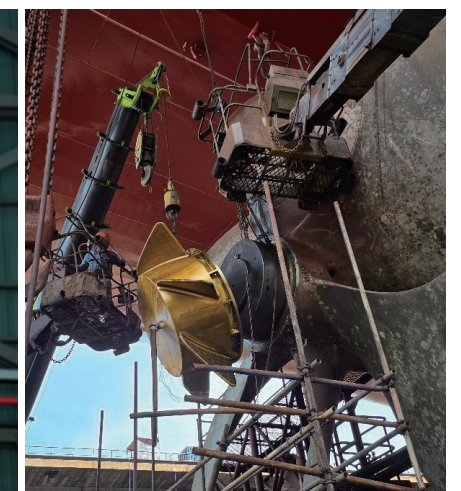■ IFO380 $350 ■ $450 ■ $550 ■ $650 ● Savings (%)

Scope of Supply

- ☑ Customized propeller cap with integrated fins
- ☑ Precision 3D CNC machining for exact hub fit
- ☑ Alignment & installation manual
- ☑ Class documentation & optional on-site support

With proven results and minimal complexity, S-Cap is the practical choice for shipowners seeking efficiency gains at low cost.

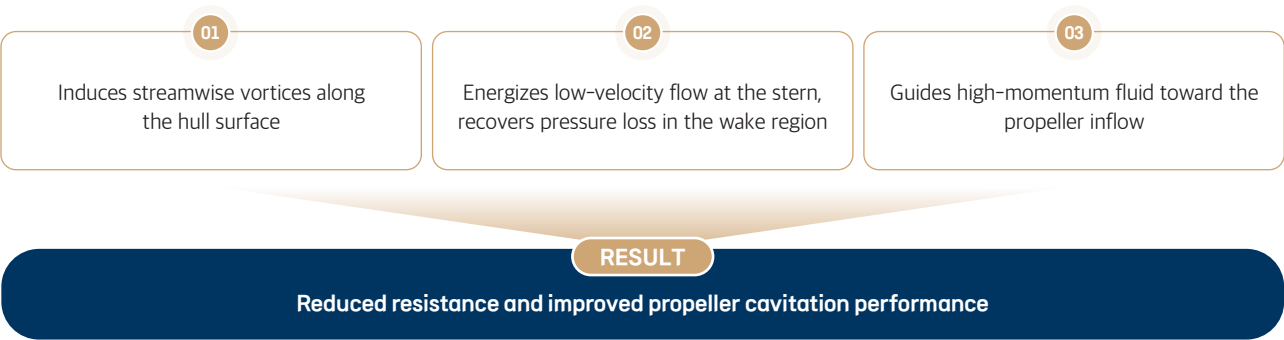S-CAP

S-CAP Installation on Propeller
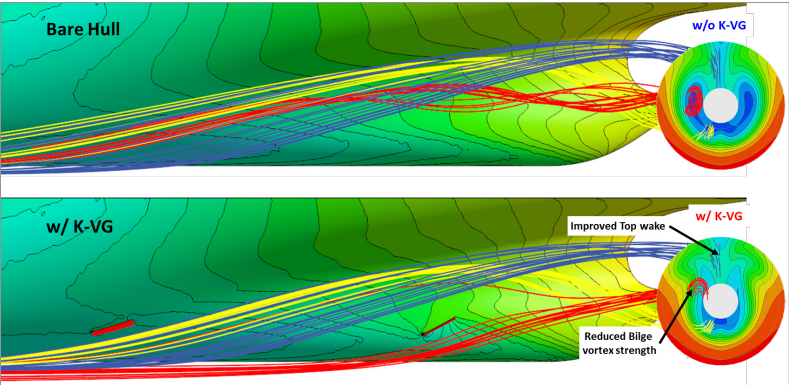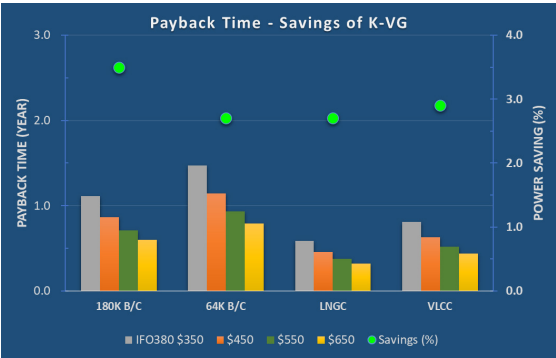
K-VG
Vortex Generator

◖● K-VG Working Principle

K-VG is a stern-mounted energy-saving device that reduces hull resistance and improves propeller inflow.
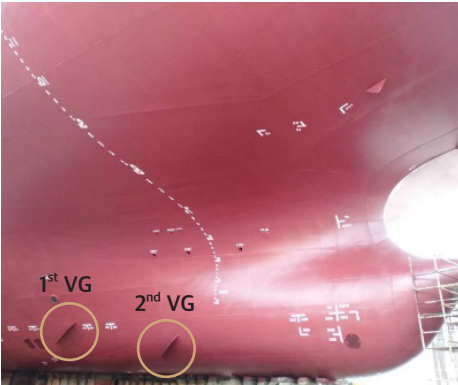
⚙ How It Works

01	02	03
Induces streamwise vortices along the hull surface	Energizes low-velocity flow at the stern, recovers pressure loss in the wake region	Guides high-momentum fluid toward the propeller inflow

RESULT

Reduced resistance and improved propeller cavitation performance

⚙ Key Features & Benefits

01	Fuel savings: up to 2-3% (laden), 3~5% (ballast)
02	Simple, low-cost installation suitable for retrofits and newbuilds
03	Short ROI with proven performance
04	Reduced cavitation, pressure pulses, vibration, and URN

Payback Time - Savings of K-VG

IFO380 $350 ■ $450 ■ $550 ■ $650 ● Savings (%)

180K B/C   64K B/C   LNGC   VLCC

Bare Hull
w/o K-VG
w/ K-VG
Improved Top wake
w/ K-VG
Reduced Bilge vortex strength
1st VG   2nd VG

K-VG Effect: Streamlines and Wake Distribution

K-VG

CFD Technology

◖● Precision-Driven Hydrodynamic Analysis for Propulsion Optimization

Computational Fluid Dynamics (CFD) is now a core technology in the accurate prediction and optimization of ship propulsion performance. Enhancing energy efficiency requires high-resolution flow analysis of all critical components - including the propeller, hull, and energy-saving devices (ESDs) - under actual operating conditions.

SILLAMETAL places full-scale propulsion performance prediction at the center of its design workflow. In retrofit applications, CFD offers a fast and cost-effective means of evaluating alternative designs. To meet these requirements, SILLAMETAL has developed a high-fidelity CFD analysis framework specifically tailored for ship propulsion applications.

⚙ High-Fidelity CFD Capability

SILLAMETAL's hydrodynamic analysis is supported by the following core technical infrastructure:

- ✓ A dedicated team of CFD engineers
- ✓ High-Performance Computing (HPC) cluster
- ✓ Viscous flow simulation based on Simcenter STAR-CCM+

SILLAMETAL performs high-fidelity CFD analyses to assess design performance at full scale.
This includes resistance, propeller open water characteristics, self-propulsion simulations that capture hull-propeller-rudder-ESD interaction, and cavitation/pressure pulse analysis to predict noise and vibration risk.

By applying high-fidelity CFD simulations, SILLAMETAL delivers accurate propulsion performance assessments that support data-driven design optimization, regulatory compliance, and improved operational efficiency.

Wave Pattern : Model Test / Simulation
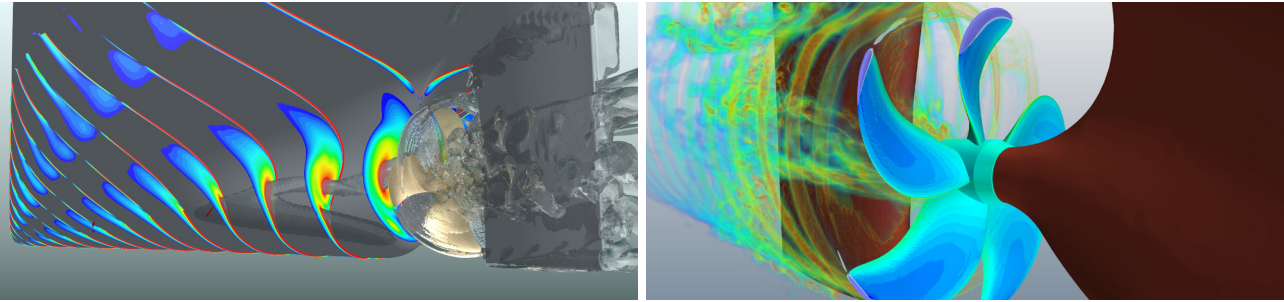
Self-Propulsion Simulation

Cavitation Simulation