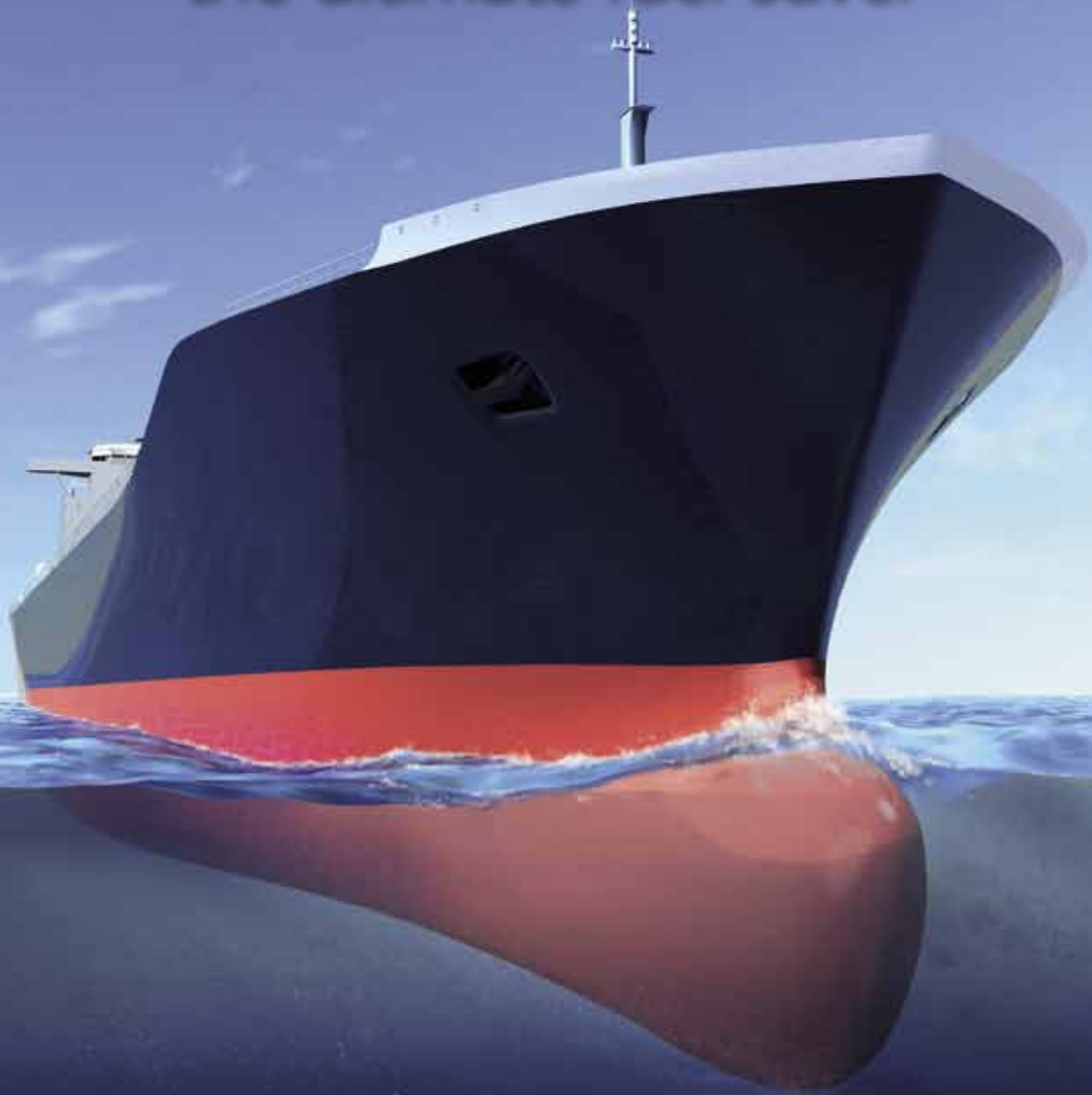


**JOTUN**

# SeaQuantum

the ultimate fuel saver



# SeaQuantum – the world's most

## The leader in fuel saving silyl technology



In 2000 Jotun, together with their Japanese partner NKM, introduced SeaQuantum. Since then Jotun has applied the SeaQuantum technology on more than 4000 vessels resulting in Jotun being the clear market leader with respect to silyl acrylate technology.

### The key properties of SeaQuantum:

- Controlled and linear polishing
- Low leached layers
- Better protection against mechanical damage
- Unrivalled track record on fuel performance
- Coating surface becoming smoother over time
- Excellent performance during outfitting periods in fresh water



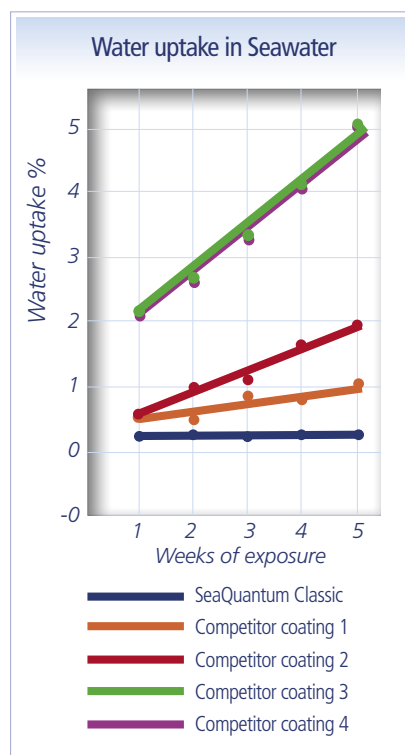
## Advanced silyl acrylate technology provides predictable performance

The polymer or binder is the most important component in a successful hydrolysing antifouling paint.

SeaQuantum is based on a silyl acrylate polymer, which is hydrolysed upon exposure to seawater.

SeaQuantum's silyl technology gives low water ingress into the coating which directs the hydrolysis towards only the surface of the coating and gives predictable performance.

Since the water insoluble polymer reacts with seawater to become water soluble, the release rate of biocides can be fine-tuned to offer excellent performance for all conditions.



## Environmentally acceptable biocides

Jotun has ten years' commercial experience with SeaQuantum's biocide combination of cuprous oxide and copper pyrithione. This effective biocide package has gained popularity. The full effect, however, is dependent on the highly controlled delivery from SeaQuantum's silyl binder system.

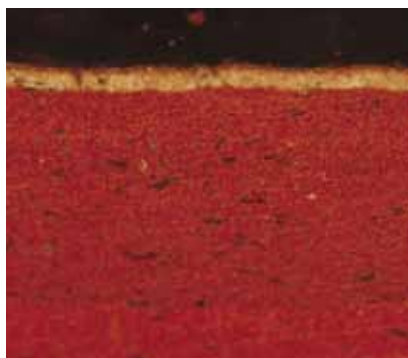
Our suppliers have spent millions of euros to document the health and environmental properties of these two biocides for EU and US authorities. The data verify that there are no unacceptable environmental effects from the leaching of these two biocides from ships' antifouling. One reason is copper and copper pyrithione's rapid deactivation or biodegradation in the marine environment.

It is Jotun's strict policy only to use biocides that possess the documentation package required by the EU.

*(Graph left) Low water uptake and chemically robust technology make SeaQuantum the perfect choice during outfitting in freshwater.*

# advanced antifouling technology

## Low leach layer



*SeaQuantum: thin leach layer*

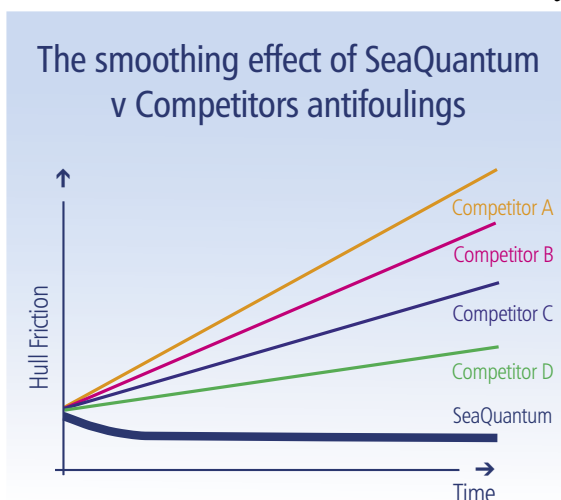
- Low leach layer – no increase in the service period.
- All antifouling releases biocides causing the formation of a leach layer.
- The low water ingress of SeaQuantum contributes to a low leach layer.
- Maintaining a low leach layer for 60 months is crucial to achieve an even biocide release from an antifouling.
- SeaQuantum delivers thinner leach layers than competing products.

## Fuel saving through smoothing

Effective antifouling paints save fuel and consequently reduce the emission to the atmosphere of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and VOC from unspent fuel.

SeaQuantum is optimised for fuel performance and has an unrivalled track record.

Due to its unique smoothing effect it achieves an average hull roughness over time that is unchallenged by any other antifouling.



## The environment

Jotun can confidently claim that the outstanding efficacy of SeaQuantum makes it the most environmental choice.

The use of environmentally acceptable biocides goes without saying. SeaQuantum's superior environmental profile is a consequence of its unparalleled effect on vessels' air emissions.

What does this technology offer?

- Confidence that a vessel's environmental footprint is kept to a minimum.
- The satisfaction of saving money for every nautical mile travelled.

Shipping accounts for more than 90% of global trade of goods. Air emissions per ton of goods transported by ship make it by far the most efficient mode of transport.

The IMO has estimated that shipping releases 2–4% of the world's total man-made CO<sub>2</sub>.

However, as vessels are large, all owners have the opportunity to make a difference.

Every purchaser of fuel knows that every increase in propulsion efficiency has a significant effect of each sailing's total bunker cost – and thus its air emissions.



# SeaQuantum facts: More than 4000 vessels painted with SeaQuantum

Market leader in silyl acrylate technology	Only SeaQuantum provides hull roughness reduction guarantee	No maintenance cost during in-service period	Tailor-made SeaQuantum products for all vessel types
SeaQuantum provides fuel savings – even without full blasting	Ultimate fuel saving under all sailing conditions	Reduced repair cost at the next docking	Only SeaQuantum provides effective protection under static and semi-static conditions

## Tailor-made solutions whatever the vessel type or speed

Vessel type	Recommended SeaQuantum system	Alternative recommended SeaQuantum system
 Crude oil tankers	SeaQuantum Classic	SeaQuantum Ultra
 General cargo carrier/ bulk carrier	SeaQuantum Classic	SeaQuantum Ultra
 Cruise liners	SeaQuantum Ultra	SeaQuantum Classic
 Container vessel <20 knots	SeaQuantum Plus	SeaQuantum Classic
 High speed container vessel >20 knots	SeaQuantum Plus S	SeaQuantum Plus
Product carriers/ tankers	SeaQuantum Classic	SeaQuantum Ultra
LNG carrier	SeaQuantum Classic	SeaQuantum Plus/Plus S
Car carrier	SeaQuantum Plus	SeaQuantum Classic

The above are general recommendations based on observed experience of the ultimate fuel saving performance. Contact Jotun for actual specifications above or for other types of vessel

# SeaQuantum ultra

For vessels trading at 0 – 20 knots

More than 1200  
newbuildings  
and drydockings  
protected with  
SeaQuantum Ultra

Specially formulated  
biocide package  
provides excellent  
antifouling performance

Designed specially  
for low speed operating  
conditions

Typical vessel type

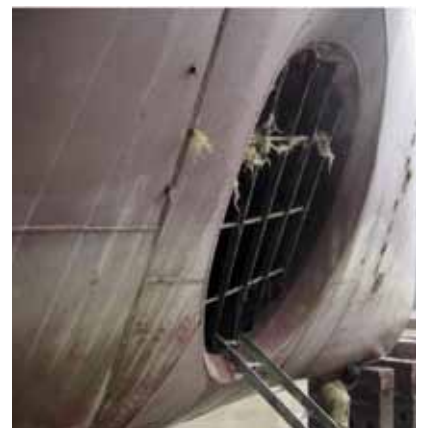


Offshore Supply Vessels  
Coastal Vessels  
Lower voyage factor <50%

## CUSTOMER EXPERIENCE

Deep Ocean Subsea Services  
multi-purpose support vessel MV  
Vos Satisfaction is protected with  
SeaQuantum Ultra.

After spending 6 months stationary  
in heavily fouled tropical waters, the  
antifouling showed very satisfactory  
performance.



Prior to water wash, contrast the  
SeaQuantum Ultra after 6 months in heavily  
fouled tropical waters and the growth in an  
area of the hull.



# SeaQuantum classic

For vessels trading at 12 – 20 knots

More than 2100  
newbuildings and  
drydockings protected with  
SeaQuantum Classic

No build-up of leach layers

Peak performance  
in even the most  
fouling intensive waters

Optimum  
fuel consumption

Typical vessel type



Bulk Carrier  
General Cargo Carrier  
Product Carrier  
VLCC / LNG

## CUSTOMER TESTIMONIAL

“*Berge Arctic*, Hull No.1127 at Daewoo Shipbuilding & Marine Engineering Co. Ltd. has been delivered and the paint systems are working well. Newbuildings Nos. 2207 & 2212 at the same yard will be painted with a 5 year SeaQuantum system.

Our experience with the SeaQuantum test patch on *Berge Signal* after 40 months at sea has been excellent.

*Igloo Hav* and *Igloo Norse* are also working well. No sign of foulings even after 2 months lay-up off Singapore for *Igloo Norse*.”

Assistant Director  
Bergesen D.Y. ASA



## CUSTOMER TESTIMONIAL

“Frontline Management first applied SeaQuantum as a five year system to the *Front Hunter* in November 2003. Since then we have applied it to six of our VLCCs and to two Suezmax vessels.

So far we have only good experience with the use of SeaQuantum Classic.”

Technical Manager  
Frontline Management A/S

# SeaQuantum classic

## CUSTOMER TESTIMONIAL

“Grieg Shipping Group has used SeaQuantum Classic, both as 36 month and 60 month system on several of our vessels.

Our conclusion from using SeaQuantum is very positive, we have experienced very good results.”

Superintendent  
Grieg Shipping Group



## CUSTOMER TESTIMONIAL

“We can confirm that we have long experience (up to 42 months) using SeaQuantum and we have not experienced any problems. Below are the vessels in question:

### Drydockings

Berge Eagle	Feb 2003
Berge Rachel	May 2003
Berge Sigval	Apr 2003
Berge Stavanger	Dec 2003
Berge Strand	Mar 2003
Berge Danuta	June 2005
Berge Flanders	Mar 2004
Berge Racine	Apr 2004
Berge Stadt	May 2004
Berge Summit	July 2005

### Newbuildings:

Berge Boston	Jan 2003
Berge Everett	June 2003
Berge Arzew	July 2004
LNG Benue	Mar 2006
LNG Oyo	Feb 2006
DSME Hull no. 2229	Mar 2007
DSME Hull no. 2230	May 2007”

Assistant Director  
Head of Newbuilding Department  
Bergesen Worldwide Gas ASA



# SeaQuantum plus

For vessels trading at 18 – 28 knots

*More than 700 newbuildings and drydockings protected with SeaQuantum Plus*

*No build-up of leach layers*

*Where selfsmoothing and excellent antifouling performance are priorities*

*Reduced fuel consumption  
Schedules are met*

Typical vessel type



Container carriers  
Ro-Ro vessels  
Medium speed container vessels

Vessels sailing at 18–28 knots with medium to high level of activity

## CUSTOMER TESTIMONIAL

“We have now experienced SeaQuantum performance for more than 5 years in our fleet and we are satisfied with the good fouling free performance. We have also noticed a considerable improvement in the fuel saving performance compared with our other vessels. The product performance really meets our expectations as shipowners.”

Technical Director,  
Peter Döhle



# SeaQuantum plus S

For vessels trading at more than 20 knots

*Lower application cost and  
less inspection time*

*Fewer coats required  
Less time in dock*

*Continuous improvement in  
docking performance*

*Higher productivity in  
new buildings*

*Better mechanical properties*

Typical vessel type



High speed container vessels  
Vessels sailing above 20 knots  
with a high level of activity



# SeaQuantum static

For static and laid-up vessels

*Where laying-up for short or long periods directly from dry-docking and new building*

*SeaQuantum Static is a last coat only, on top of the paint system designed for trading. Provides additional predictable protection for 24 months*

*Gives a hard finish. Silyl technology provides great mechanical strength and good drying times*

*Contributes toward reduced risk of damage*

Typical vessel type

Static vessels

All types of vessels laid-up for up to 24 months before re-entering trade



*(Above) SeaQuantum Static after 10 months in static conditions.*





## Uniform Standard of Global Service

### Global service

- Highest number of technical personnel in the industry
- Same high standard of trained personnel globally
- Easy to exchange trained technical personnel across national borders and multi-national projects

### Standardised

- Same tools, reports, procedures and behaviour world-wide.
- Same competence in maintaining company standard procedures
- Recognised globally by their yellow and red boiler suits

### Coating Advisor Academy

- Compulsory training for all technical personnel worldwide
- Theoretical and practical training testing and examination
- FROSIO and NACE certification
- First Aid and Fire-Fighting



**Trained to Deliver the Ultimate Result**

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