Ultrasonic Anti-Fouling

The sound solution against marine growth
Marine fouling

Fives (5) stages of biofilm development. (Pseudomonas aeruginosa biofilm)
- initial attachment (minutes)
- irreversible attachment (24-48hours)
- maturation I
- maturation II
- dispersion (weeks)
UltraSonic Anti Fouling

- Sends ultrasonic sounds into water (sounds above 20Khz)
- Creating cavitation on microscopic level (gas bubbles)
- Bubbles implode causing high pressure waves, 2000 bar and temperatures up to 5000 °C
- USAF creates an environment that prevents larvae to attach to the ship or construction.
Benefits Ultrasoon Technology

- Environmental friendly
- No anti-fouling necessary
- No resistance from organisms which results
  in less CO2 production
- Optimum cooling guaranteed because
  box coolers remain clean
- Less maintenance
- Less down time due to docking
Applications

- to prevent fouling of hulls
- to prevent fouling of box coolers and sea chests
- to prevent fouling of underwater constructions

**Ultrasonic Anti-Fouling** systems are extremely suitable for the use in a very wide range of industries such as:

- Shipping industry
- Off-shore industry
- Energy industry
- Tidal energy generators
- Food industry
Hull applications
Hull applications
**Hull applications**

<table>
<thead>
<tr>
<th>Vessel:</th>
<th>m/v Nova Cura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>Gen. cargo, 5641 DWT</td>
</tr>
<tr>
<td>Length:</td>
<td>107 mtr.</td>
</tr>
<tr>
<td>Owner:</td>
<td>Nova Seatransport</td>
</tr>
<tr>
<td>Application:</td>
<td>Hull (SB + PS) + box coolers</td>
</tr>
<tr>
<td>Since:</td>
<td>2009</td>
</tr>
<tr>
<td>Remark:</td>
<td>Tested in association with TNO</td>
</tr>
</tbody>
</table>
## Hull applications

<table>
<thead>
<tr>
<th>Vessel:</th>
<th>m/v Fjord</th>
</tr>
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<tbody>
<tr>
<td>Type:</td>
<td>Semi Sub, 24800 DWT</td>
</tr>
<tr>
<td>Length:</td>
<td>159.6 mtr.</td>
</tr>
<tr>
<td>Owner:</td>
<td>Fairstar Heavy Transport NV</td>
</tr>
<tr>
<td>Application:</td>
<td>Hull (2 x PS + 2 x SB)</td>
</tr>
<tr>
<td>Since:</td>
<td>Installation 2012-04</td>
</tr>
<tr>
<td>Remark:</td>
<td>Fairstar is involved in the Gorgon project @ Barrow Island, Australia</td>
</tr>
</tbody>
</table>
Box-cooler applications

1. Bracket should be welded at the bottom longitudinal or other suitable location.
2. Longitudinal and adjacent bracket should be coated with supplied epoxy.
3. Sensor case should be coated with the supplied epoxy.
4. Do NOT apply epoxy on the emitting heads.

FORREFERENCEONLY
Box-cooler applications

Vessel: m/v Tempest
Type: Gas tanker, 1809 DWT
Length: 99,9 mtr.
Owner: Chemgas Shipping BV
Application: Boxcooler (SB, PS not)
Since: 2011-09
Remark: According to Dutch Shipping Inspection Society a clear difference between PS delta-T and SB delta -T
**Box-cooler applications**

<table>
<thead>
<tr>
<th>Vessel:</th>
<th>m/v Rebecca Borchard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>Container Ship, 9620 DWT</td>
</tr>
<tr>
<td>Length:</td>
<td>141.6 mtr.</td>
</tr>
<tr>
<td>Owner:</td>
<td>CV Flintercoast</td>
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<tr>
<td>Application:</td>
<td>Boxcoolers PS &amp; SB</td>
</tr>
<tr>
<td>Since:</td>
<td>2012-08</td>
</tr>
<tr>
<td>Remark:</td>
<td>According ship owner a significant reduction on fuel costs</td>
</tr>
</tbody>
</table>
Box-cooler applications

Vessel: m/v Disney Wonder
Type: Passenger Ship, 8604 DWT
Length: 294 mtr.
Owner: Disney Cruise line
Application: 27 mtr. Cross-over tank
3 sensors on PS none on SB
Since: 2012-09
Remark: Result after 6 months in tropical water.
The **Ultrasonic Anti-Fouling system** consists of a transducer which sends ultrasonic sound into the water via titanium transducer heads.

This **ultrasonic sound** creates micro cavitation bubbles, which will grow, then they become instable, and will implode.

During this **imploding** process they produce locally
- a very high pressure ( > 2000 bar), and
- a local very high temperature ( approx. 5000 °C)

These implosions results in **“shock-waves”** which create a very unattractive atmosphere for larva’s to attach and settle down
Technical information

Since larva's will not attach to the ship’s hull, box coolers or other submerged parts of the vessel or construction, same will stay clean of marine fouling.

So the systems has to be switch-on only when the larva's are present in the water and have time enough to attach to the hull, coolers and/or construction moreover, in order to settle themselves for incubation.

At sailing speeds of 6 knots or more fouling larva's are not able to settle down, therefore the systems needs to be switched-on only by speeds lower than 6 knots or at anchorage and/or D.P operations.
In case of *idling situation larva’s will attach.*

During the **first 36-48 hrs** this is *not dramatic*, because the larva's will begin to settle themselves, however, it is **still possible to dislodge** these fouling larva's **by turning on** the system again.

In case the system is **switched off** for a period **longer than 48 hrs** during an idling situation the larva’s have matured and an irreversible basis for further growth and settlement will be created.

Important remark: **UltraSonic Anti-Fouling** doesn’t kill fouling (larva’s)!

The **UltraSonic Anti-Fouling** system runs on **240V, 50Hz or 60Hz**, and is supplied including switchboard and cabling for “**plug and play**” use.
Technical information

With the aim of the supply of a ‘turn-key’ SOUND solution

Ned Marine Services BV

will be pleased to take care of a proper 3D-installation plan and is ultimately available for worldwide installation and commissioning of the systems.
The installing of an **UltraSonic Anti-Fouling** system is an investment with a very short ROI.

Same is obtained by means of:

- no fouling, resulting in **a significant fuel saving** (5% - 7%)
- no fouling, which means **no loss of sailing speed**
- no fouling, which means **less docking costs** and **less “off-hire”**
- **no** longer need for applying costly **Anti-Fouling paints**
Investment

In most of the cases known so far the **ROI** is **less than one year**

so

installing an **UltraSonic Anti-Fouling** system is

not a cost but an

**Earning**
For further info or inquiries please contact

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e-mail: info@nedmarine.com

website: www.nedmarine.com
For further info or inquiries please contact your provider for a **SOUND SOLUTION** for your fouling problem.
Thank you for your time and interest !!!