Cathelco®
Evac Group

# USP DragGone™

## Heterodyning and Guided Wave Ultrasonic Technology: A Complementary Solution for Ship Hull Fouling Protection

Ultrasonic antifouling system designed to prevent biofouling on vessel hulls by using patented ultrasonic technologies

**Dr Sasha Heriot**
sasha.heriot@evac.com

IAC 10-11 September 2025

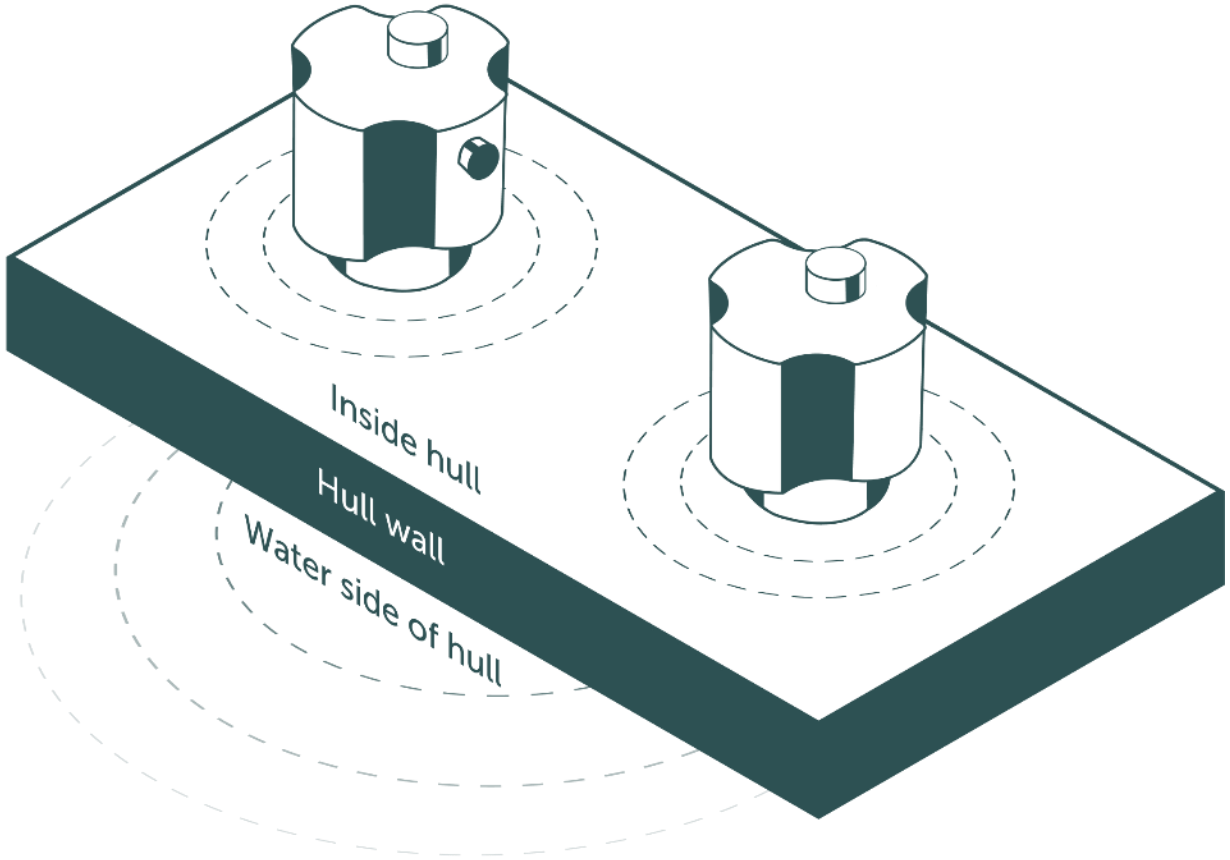
Cathelco®

# What is ultrasonic antifouling technology?

**Ultrasonic antifouling:**

- Uses high-frequency sound (ultrasound) to prevent or reduce biofouling on underwater structures, surfaces, and medium
- On vessels, ultrasonic transducers are installed on the **inside of the vessel hull**
- High frequency sound waves **prevent the formation of micro- and macrofouling**

Using conventional methods, each single transducer can protect ~5m radius (50-80 m²)



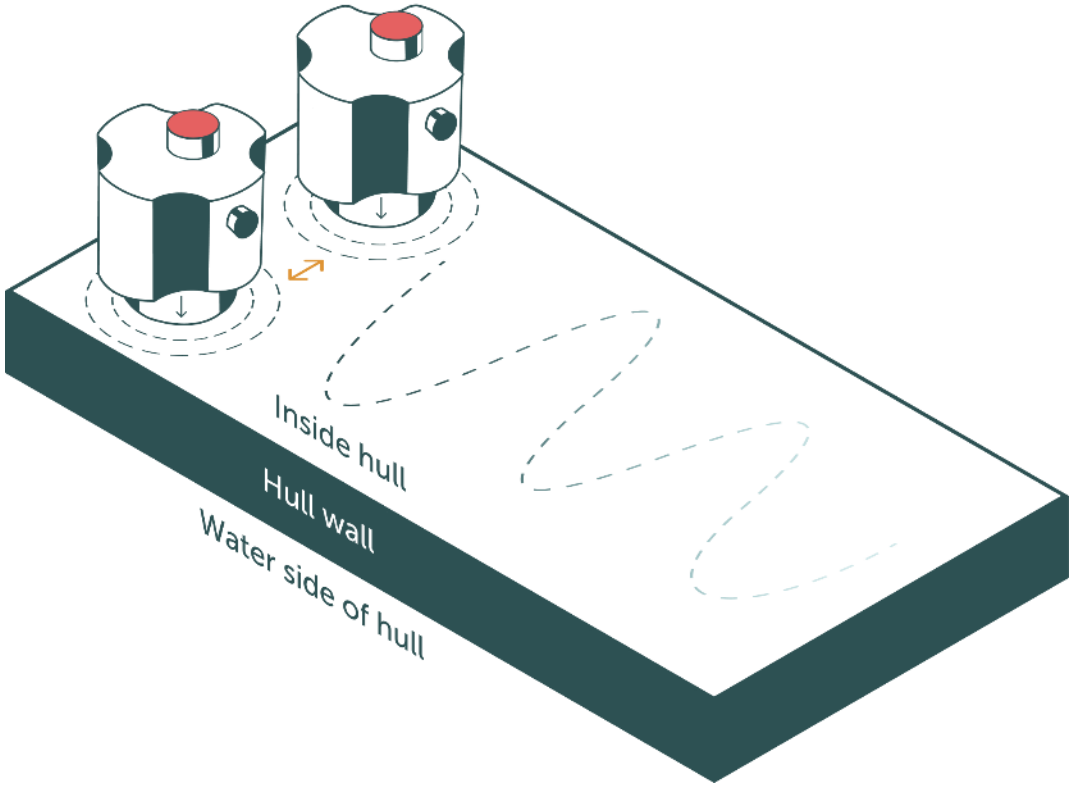
Cathelco®

# Our patented solutions for better performance

## Guided wave principle

- Guided waves are **ultrasonic waves** that travel along the boundaries or surfaces of structures
- When used in ultrasonic antifouling devices, guided waves channel energy along the surface structure, **minimizing energy loss to the surrounding water**
- Wider coverage provides antifouling protection over a larger area, 25m radius, ~2,000m², **40 times more than traditional ultrasonic technology** (5m radius, 50-80m²)

**How it is applied in our system:**
Two transducers at the same frequency placed at a specific distance apart to generate guided waves




Complete hull protection with 60% fewer transducers – cut installation and operating costs

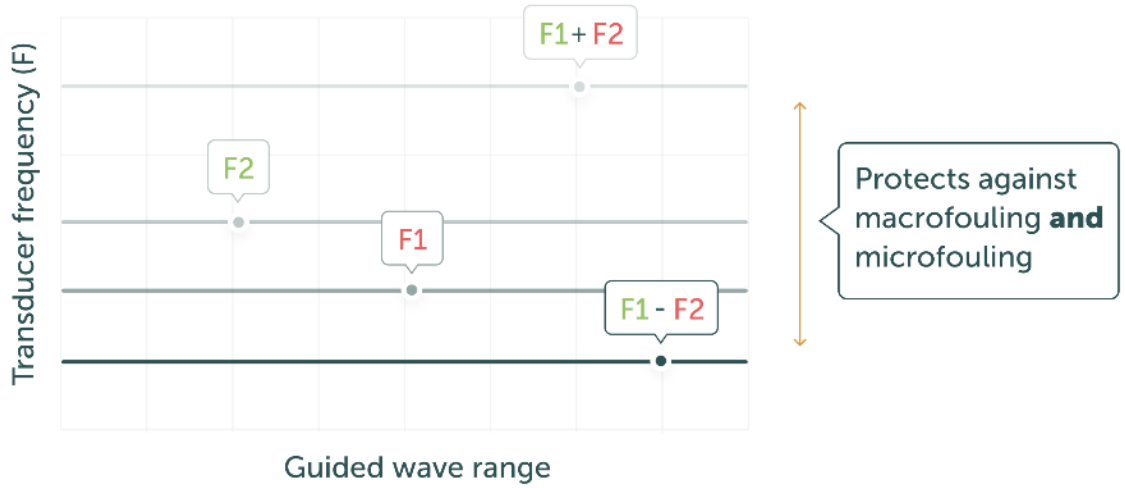
Cathelco®

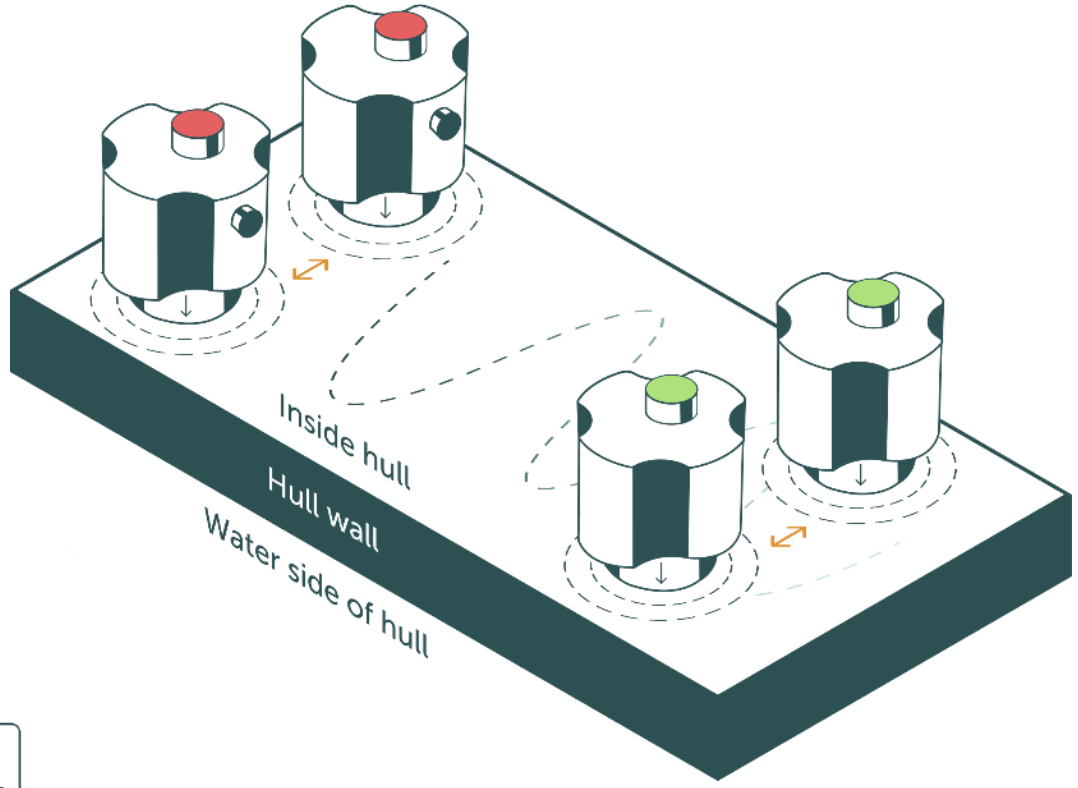
# Our patented solutions for better performance

## Heterodyning principle

- Heterodyning is a technique in signal processing where two signals at different frequencies are mixed to produce new frequencies, specifically the sum and difference of the original frequencies

**How it is applied in our system:**
Our system uses two additional transducers operating at different frequencies at each location, in addition to the guided wave transducers. These transducers generate new frequencies, enhancing the overall effectiveness of the system.



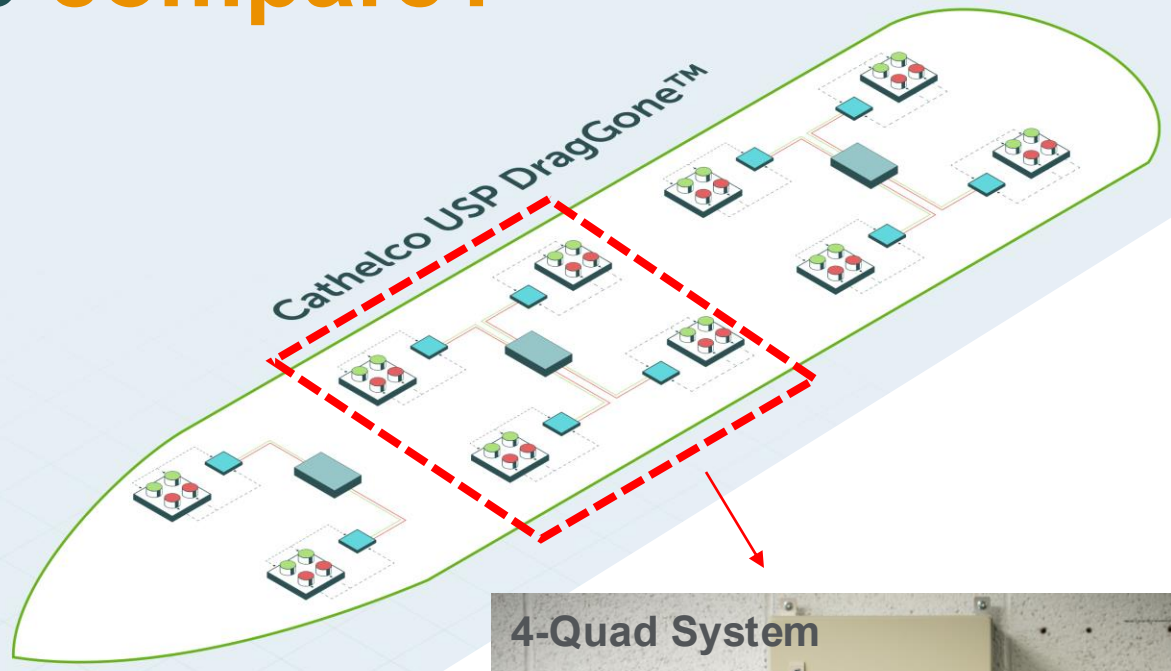




With more ultrasonic frequencies a broader range of fouling can be treated more effectively

# How do we compare?

## USP DragGone™

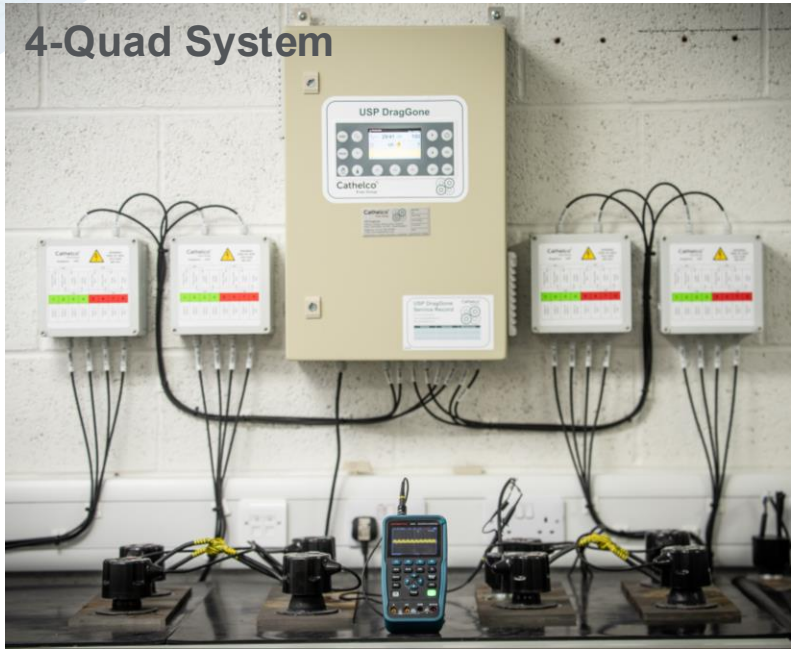
Visualisation of configuration for 250-meter vessel




| | Cathelco USP DragGone™ |
|---|---|
| Control panels | 3 |
| Transducer locations | 10 |
| Cable runs | 10 |
| Number of transducers | 40 |

- Ultrasonic transducers
- Control panel
- Local junction box

- 1 control panel
- 4 junction boxes
- 4 sets of 4 transducers

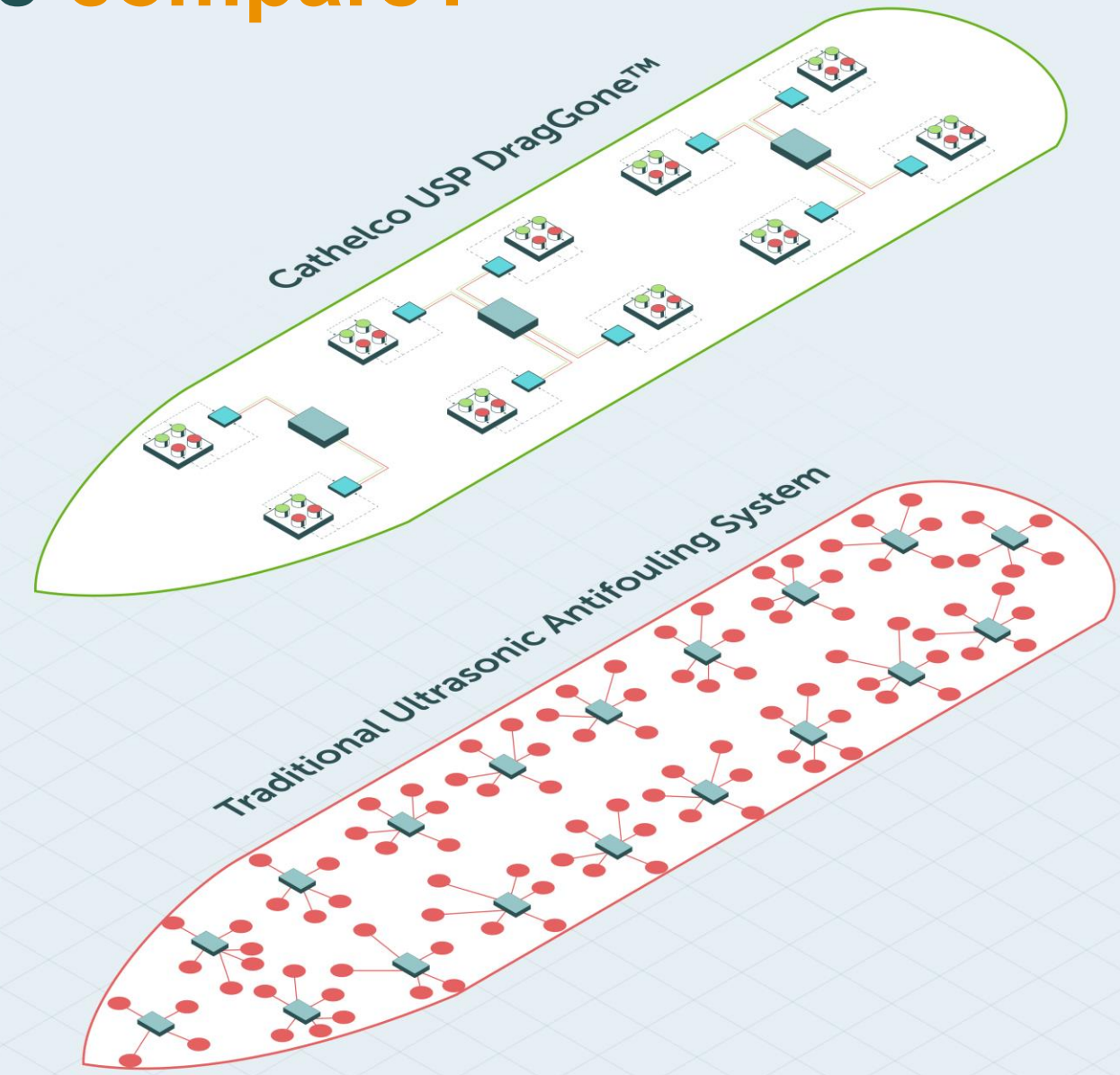


# How do we compare?

## USP DragGone™

Visualisation of configuration for 250-meter vessel

| | Cathelco USP DragGone™ | Traditional Ultrasonic Antifouling System |
|---|---|---|
| Control panels | 3 | 18 |
| Transducer locations | 10 | 96 |
| Cable runs | 10 | 96 |
| Number of transducers | 40 | 96 |




Ultrasonic transducers

Control panel

Local junction box

Cathelco®
Evac Group

# Case Studies

# Case 1:Coast Guard Vessel

Cathelco®

## Malapascua

- 40m
- Installed November 2024
- 2-quad system
- 10 months in operation
- Location – Philippines


> We have a big problem with hull fouling in the warm waters where we patrol.
>
> We regularly send divers to clean the hull and we want to make our operations safer.
>
> - *Chief Engineer*

## Challenges

- **Installed in-situ in harbour – was not pre-cleaned**
- **No images taken of hull during installation**

Case 1: Coast Guard Vessel

# Diver Inspection – 3 Months

Cathelco®



## 10 Month update

- NO hull cleaning has been required

**Challenges**

- No photos of hull during installation
- Hull was not clean before installation
- Subjective data
- Vessel operations restrict access to vessel

Cathelco®

# Case 2: Motor Yacht

## MMM

- 49m
- Installed January 2024
- 2-quad system
- 20 months operation
- Location - Mediterranean

> We are planning some world trips to unique and sensitive regions where preventing the transfer of invasive species is a top priority. In these areas, hull cleaning is not an option.
>
> Our management want alternatives to hull cleaning so we can travel to sensitive areas, reduce our OpEx costs and improve safety.
>
> *– Chief Engineer*


## Challenges

- **Installed in-situ in harbour – had been cleaned in recent months**
- **No images taken of hull during installation**

Cathelco®

# 9 month inspection


Inma interviews Chief Engineer Liam

After this amount of time with extended idling—we would expect significant fouling. In the past, the entire hull would often be covered with barnacles.

We typically repaint the entire yacht every two years. This time, we've only observed slight fouling around the waterline, so we expect the coating life to be extended. We may just apply an additional coat at the waterline rather than a full recoating.

When we entered the sensitive region, we had a diver inspect and photograph the hull. The inspection showed minimal fouling, and we were quickly on our way.

**Challenges**

- No photos of hull before installation
- Hull was not 100% clean before installation
- Qualitative rather than quantitative assessment

Cathelco®

# Case 3:Bulk Carrier

## African Griffon

- 200m
- Installed October 2024
- 12 months operation
- Location – West Africa

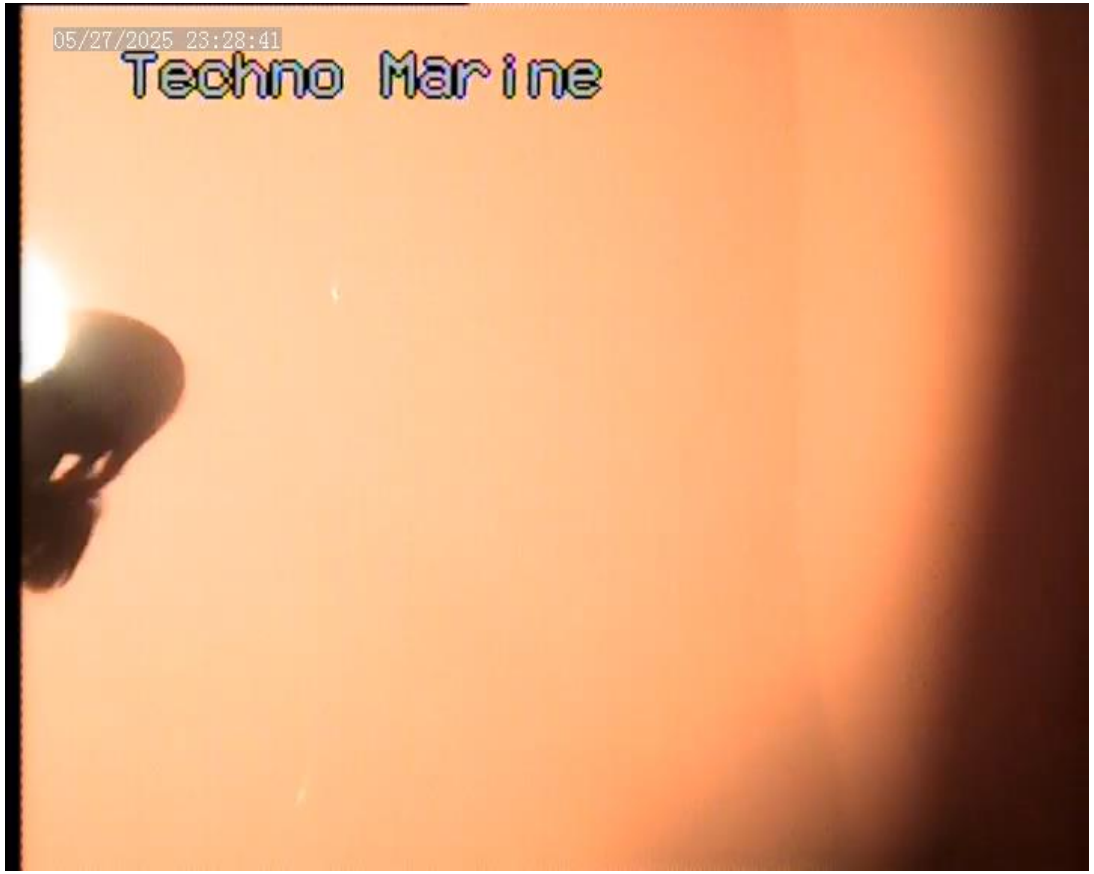

> We are looking at improving our maintenance routines and especially reduce hull cleaning costs as well as work towards being more sustainable with improvements to fuel efficiency.
>
> *– Ship Manager*

## Challenges

- **Vessel was selected by the operator as a perfect for trial due to long periods idling in warm water**
- **After start of trial, their route operations changed significantly – meaning less idling**

Cathelco®

# Diver Inspection - 8 Months


**Challenges**

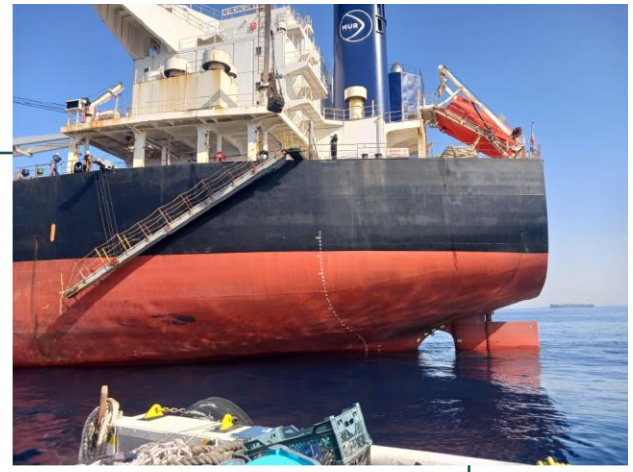
- Vessel operations changed
- Continuing with trial to gather more data

MUR Shipping Trials USP DragGone™ on African Griffon

Cathelco®

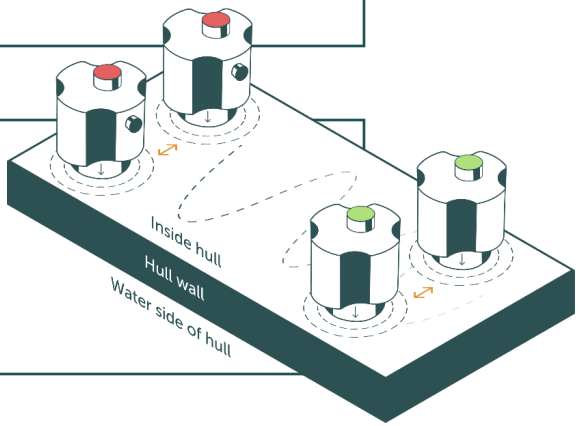
# Conclusions

## Challenges



- **Real-world data** collection is difficult
- **Installation timing**: dry dock vs. in situ
- **Hull must be cleaned** before system switch-on
- **Reference images** before/after installation and during trials challenging
- **Vessel operations** constantly changing

## Technology & Performance




- **No single solution** – requires combination of technologies
- **Positive** feedback so far
- **Different** from previous ultrasonic approaches: Guided Wave + Heterodyning

## Environmental Considerations


- Key focus: **marine mammal** impact
- DHI **Noise Simulations** varied depths, distances, impact on mammals
- Further studies required
- We have **ability to tune** the system for best environmental impact and performance
- Conscious of **underwater noise** – must not replace one pollution with another

# USP DragGone™

# Thank you for listening!

**Dr Sasha Heriot**
sasha.heriot@evac.com

Patrol vessels 51m, 2-Quad


Offshore vessel, 71m, 2-Quad

Fishing vessel 47m, 2-Quad