Cathelco®

Ultimate buyer's guide to ultrasonic antifouling systems

EVER WONDER...

How does ultrasonic antifouling work?

How to choose the right ultrasonic technology?

How to select the best ultrasonic antifouling partner?

FIND IT OUT IN OUR GUIDE

Cathelco®

ULTIMATE BUYER'S GUIDE TO ULTRASONIC ANTIFOULING SYSTEMS

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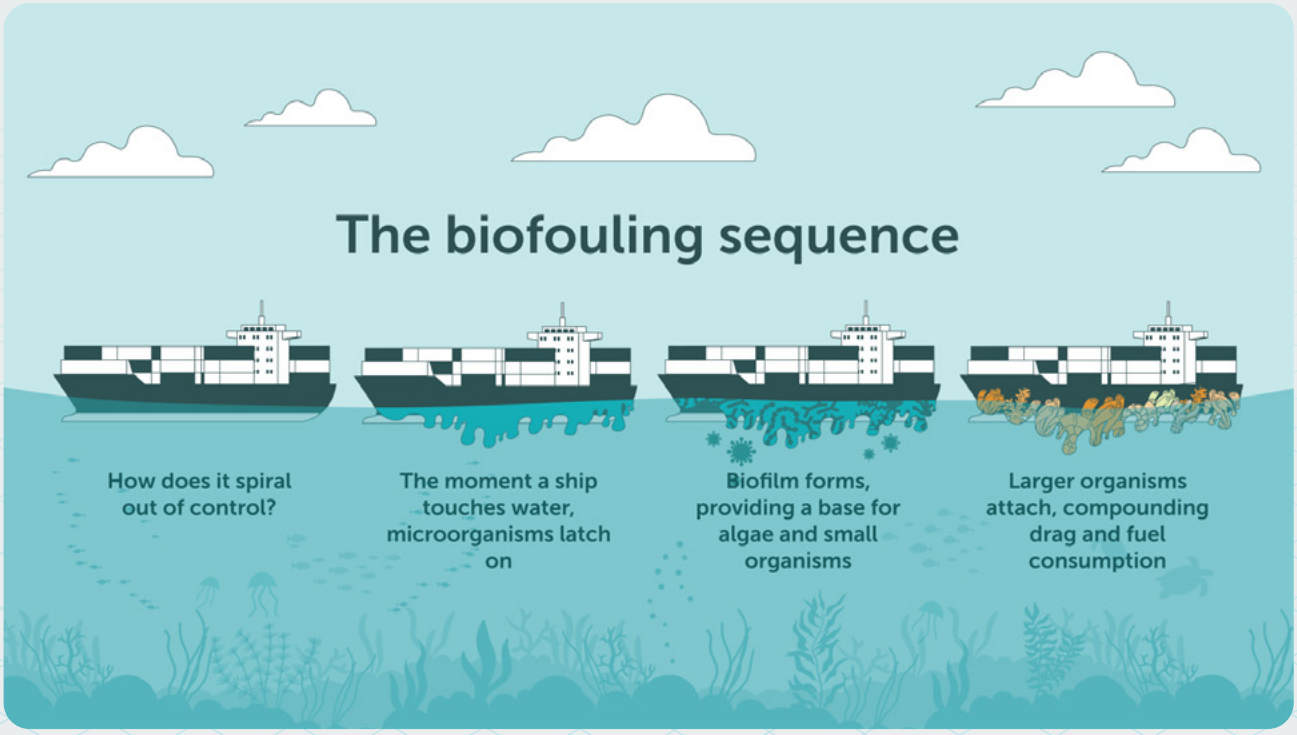
What is biofouling and why does it matter?

Vessel biofouling occurs when aquatic organisms attach and accumulate on a ship's underwater surface, such as the hull, sea chest, propeller, thrusters, bilge keel, and keel coolers. When biofouling occurs, it reduces a vessel's fuel efficiency, accelerates the spread of invasive species, increases CO_2 emissions, and jeopardizes overall operational efficiency due to increased hydrodynamic drag. Fortunately, ultrasonic antifouling is a reliable and eco-friendly method of preventing biofouling.



What is ultrasonic antifouling?

So, what is ultrasonic antifouling? It is an antifouling system that uses ultrasound technology to prevent biofouling on a vessel's hull. It emits high-frequency sound waves that create a high-pressure barrier in the hull's plating, preventing invasive aquatic organisms from attaching, reproducing, and spreading further on the surface.

Ultrasonic antifouling systems represent a modern advancement in hull protection, moving beyond reactive measures like hull scraping and cleaning to more proactive methods. Fleet managers today are increasingly evaluating the benefits of ultrasonic systems against these conventional techniques, recognizing their efficiency and cost-effectiveness. These systems are not only replacing some traditional methods but also working in tandem with advanced paints to provide comprehensive hull protection.

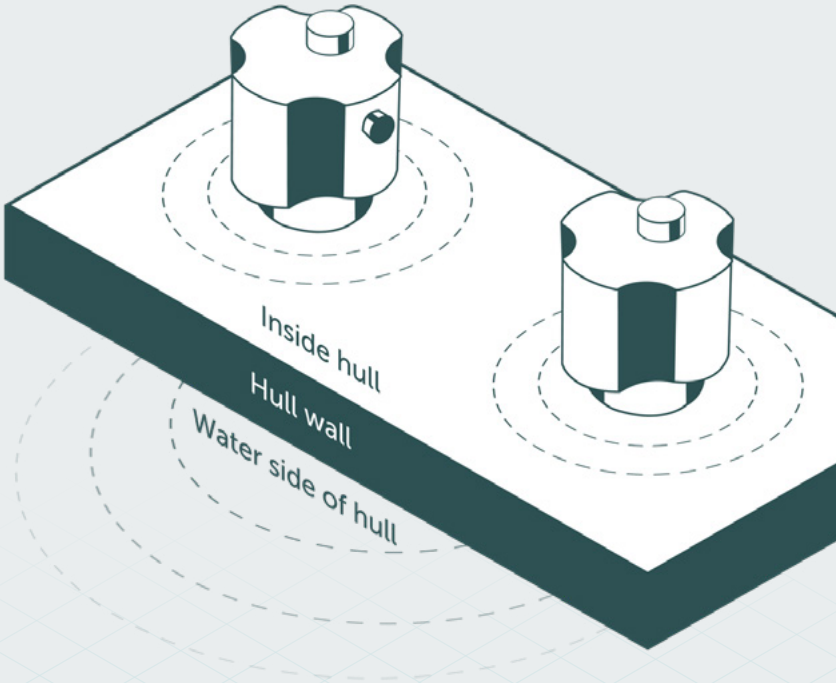
This comprehensive buyer's guide explains everything you need to know about ultrasonic antifouling systems to help you buy the right one and achieve maximum efficiency.

USP DragGone™

Advanced ultrasonic antifouling technology, such as Cathelco's USP DragGone™, has taken ultrasonic antifouling to the next level by enhancing operational efficiency and cost savings. It's more **eco-friendly, easier to install and maintain,** uses up to **60%** fewer transducers, and **boosts fuel efficiency.**

60%
fewer transducters

Understanding ultrasonic antifouling technology



An ultrasonic antifouling system has two main components:

- **Modular power control unit** that generates ultrasonic frequencies
- **Ultrasonic transducers** that induce the ultrasonic waves (vibrations) into the hull

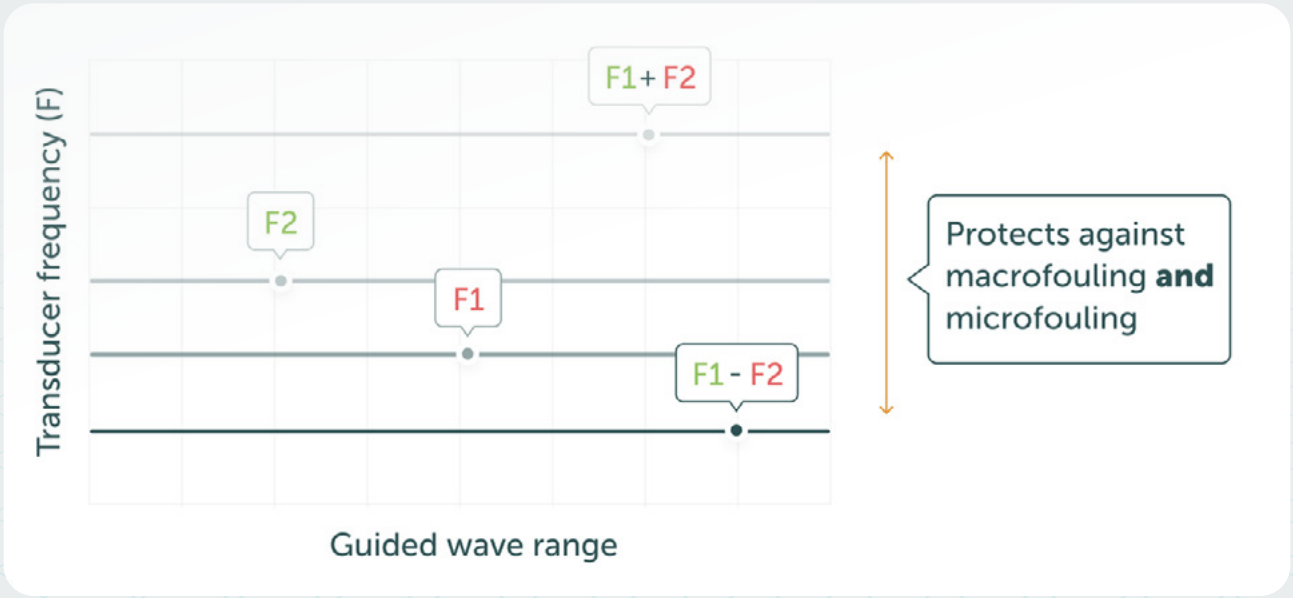
The principle of operation is that vibrations generated by the transducers induce acoustic pressure into the hull. This pressure prevents fouling microorganisms from attaching, thereby stopping the formation of a biofilm, which larger organisms would otherwise attach to.

The power control units help regulate the intensity of ultrasonic waves to disrupt attachment of soft or hard-fouling organisms.

Types of ultrasonic technologies

Single frequency vs. multi-frequency systems

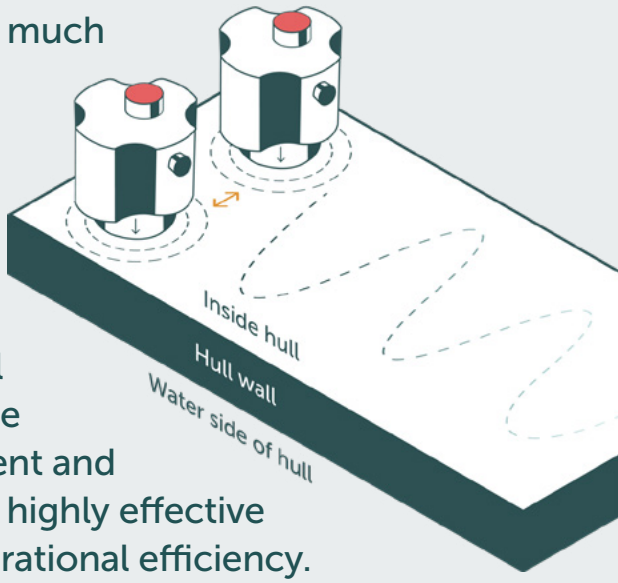
One significant advantage of a system emitting multiple frequencies over single frequency transducers is the increased efficacy in preventing biofouling. Both single-frequency and sweeping frequency systems are non-optimal: single-frequency systems target a narrow range, while sweeping systems lack simultaneous multi-frequency coverage for diverse fouling organisms. In contrast, a system that emits multiple frequencies, like ones using Heterodyning, creates a broader spectrum of ultrasonic waves.



This broader spectrum disrupts a wider range of fouling organisms, making the antifouling system more versatile and effective. Additionally, the combination of Guided Wave and Heterodyning principles ensures that the energy is channeled more efficiently and over greater distances, providing superior antifouling protection compared to systems using single frequency transducers.

Systems applying the guided wave principle

Systems applying the guided wave principle channel ultrasonic waves along the structure of the hull, allowing for up to 40 times greater areas to be covered compared to traditional ultrasonic technologies. This method ensures that the energy from the ultrasonic waves travels within the hull structure rather than dissipating into the surrounding water.

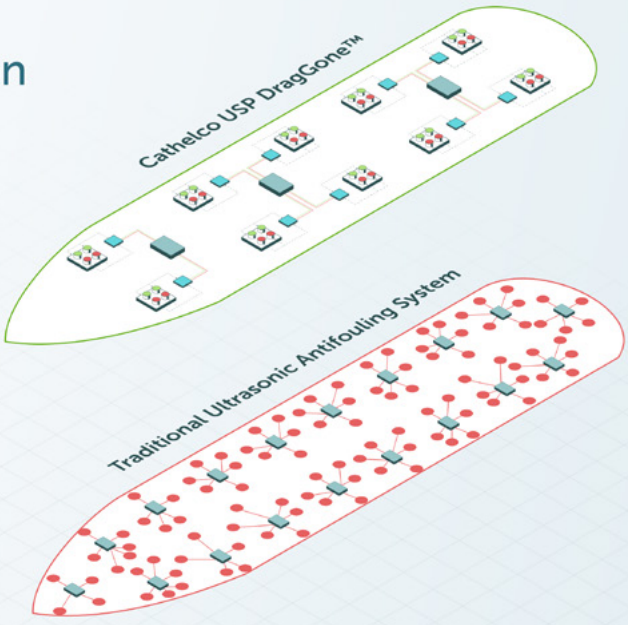


As a result, antifouling protection extends over a much larger area, specifically up to a 25-meter radius (approximately 2,000m^2), compared to the 5-meter radius (50-80m^2) typical of traditional ultrasonic technology. This efficient energy transfer reduces the number of transducers required for complete hull coverage, minimizing installation time and lowering overall costs. By focusing the ultrasonic waves within the hull, guided wave systems provide more consistent and reliable antifouling performance, making them a highly effective solution for maintaining hull cleanliness and operational efficiency.

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



Key factors to consider when choosing an ultrasonic antifouling system

Weigh the following crucial factors before buying a system.

Vessel compatibility

The effectiveness of ultrasonic antifouling depends on how well ultrasonic waves pass through or propagate along the hull surface. Thus, the hull material and construction design directly affect the transmission of vibrations. Aluminium and steel are excellent transmitters of ultrasonic vibrations, so hulls made of these materials are perfect candidates for ultrasonic antifouling.

On the other hand, materials such as wood and ferrocement absorb vibrations rather than amplify. This means that ultrasonic antifouling is not as effective on wood and ferrocement hulls. If your vessel's hull is constructed with such sound-absorbing materials, you should consider other antifouling methods.

In other cases, a hull may be constructed of excellent transmission materials such as aluminum, but its inner layer is padded with sound-absorbing materials such as foam and balsa core. Such vessels cannot transmit ultrasonic waves without you first modifying the hull's inner layers to place the transducers in strategic spots where they'll spread vibrations to the hull.

Vessel size

The size of a vessel determines how many transducers the ideal ultrasonic antifouling system should have. The longer the vessel, the more transducers a system will need to channel vibrations to the hull's entire surface effectively. If you install fewer than the required transducers, they'll not reach parts of the hull, leading to inefficient wave transmission.

Our USP DragGone™ system can transmit ultrasonic energy in large vessels using fewer transducers, thanks to our proprietary Guided Wave Technology. This unique tech enhances the channeling of ultrasonic energy, increasing the range of protection while using **60% fewer transducers.**

60%
fewer transducters

Operational environment

Modern ultrasonic antifouling systems don't transmit ultrasonic vibrations directly into the water but through the hull's surface. They're effective for both fresh and salt water. You don't even have to recalibrate or commission the system when your vessel switches between fresh and salt water. However, regardless of the marine environment, the type of hull material affects the performance of ultrasonic antifouling systems.

Installation requirements

The installation process of an ultrasonic antifouling system can be easy or a bit technical, depending on how accessible the hull is and the complexity of a vessel's electrical system. This is because the power control box must be connected to the ship's power system and the transducers to the interior side of the vessel's hull.

Before installation, technicians should assess whether any major electrical modifications are required and the level of intervention needed to reach the inside of the hull. The hull must be cleaned first or shortly after installation, as ultrasonic antifouling prevents biofouling but doesn't remove existing fouling or barnacles, and it won't be effective until the hull is cleaned.

If no major modifications are needed, installation is relatively easy, especially for modern systems. The latest systems operate at safe voltage levels per marine electrical standards, making installation of the power control box straightforward. Ultrasonic transducers are always fitted to the hull's interior with epoxy adhesive, so there are no hot works or hull penetrations involved.

Installing on new vs. Old vessels

The installation process on older vessels is the same as on new vessels. Older vessels, however, require a more extensive hull cleaning procedure to remove existing fouling and corrosion before the system is effective. You can also install an ultrasonic antifouling system on older vessels already using other antifouling methods such as impressed current cathodic protection (ICCP) or antifouling paints without any integration problems.

With USP DragGone™, you can enjoy fuel consumption savings of up to **13%.** And with a service life expectancy of over 10 years, you'll enjoy more long-term savings, making your investment profitable.

Achieve up to

13%

reduction in fuel consumption

Technical considerations

When choosing an ultrasonic antifouling system, understanding the technical aspects is crucial to ensuring you make the best investment for your vessel. One of the primary factors to consider is the type of ultrasonic technology used. Systems that utilize modern multi-frequency technology are generally more effective as they can address a wider range of biofouling organisms. This results in better protection and longer intervals between maintenance.

Power consumption is another critical element. It is important to ensure that the system's voltage levels comply with marine electrical standards to avoid overloading your vessel's electrical system. Proper compliance ensures the system operates efficiently without compromising the overall electrical integrity of your vessel.

Integration with existing systems on your vessel is also a key consideration. The ultrasonic antifouling system should seamlessly integrate with your current hull protection and monitoring systems without requiring significant modifications. This helps in maintaining operational efficiency and reduces the potential for technical issues during operation.

Ask these key questions to get it right:

- **Type of ultrasonic technology:** Does the system use single or multiple frequencies? How does this technology address a range of biofouling organisms?
- **Power consumption:** What are the system's voltage requirements, and do they comply with marine electrical standards? What is the typical power draw under standard operating conditions?
- **System integration:** How will the ultrasonic system integrate with existing hull protection and monitoring systems? Are additional hardware or software needed for seamless integration?

Maintenance and operational considerations

Ultrasonic antifouling systems are typically automatic with minimal maintenance required and usually do not need adjustments during routine operation of the vessel. However, just like with any other critical equipment, careful attention on a routine basis should be given to the following points by the ship's staff to ensure that the system operates at maximum efficiency at all times.

Every day:

Check system status: Ensure the control panel display is illuminated and power indicators are showing that the system is operational. Monitor for any error messages or erratic frequency readings. Report issues to the manufacturer immediately.

Every month:

Submit monthly readings: Some suppliers require you to complete and submit monthly log sheets to the manufacturer for analysis. This helps track the system's performance and identify any potential issues.

Every 3 months:

Inspect and clean equipment: Power off the system, inspect for loose wires or defects, and ensure ventilation grilles are unobstructed. Clean any dust or dirt to maintain optimal operating conditions.

After dry dock:

System re-calibration: Switch on the system to ensure optimal protection. An approved service engineer should recalibrate and commission the system to ensure correct operation post dry-docking.

30 days prior to dry docking:

Pre-dock inspection: It is advised to schedule an engineer to perform a full system check prior to dry docking. Sharing log sheets for assessment to ensure necessary spares are dispatched in time is good practice. Continuously log system readings up to the dry dock entry. Having an engineer during dry docking ensures the system is serviced and ready for operation.

As long as you get the initial installation right and your vessel doesn't develop external complications such as electrical faults, you can enjoy over 10 years of service life with minimal maintenance.

Cost considerations

Cost varies significantly for ultrasonic antifouling systems depending on the size of the vessel and the number of transducers required. A basic unit, consisting of a control unit and two transducer, is the most affordable option and is well-suited for smaller (<50 meter) vessels. However, larger vessels such as superyachts and ferries necessitate multiple transducers, resulting in higher upfront costs.

It's important to note that there is a wide range of ultrasonic antifouling systems available on the market, and their costs reflect differences in design, durability, and intended use. Cheaper systems are often geared toward pleasure craft and may not be designed to last multiple years. These systems might offer initial cost savings but could incur higher maintenance and replacement costs over time due to their shorter lifespan and lower robustness.

In contrast, systems designed for commercial use are typically more robust and incorporate considerable design enhancements that justify their higher cost. These systems are engineered to withstand harsher operating conditions and provide long-term reliability, making them a better investment for commercial vessels that require dependable performance.

Moreover, the most advanced ultrasonic antifouling systems, while having a higher initial cost, include innovative design features that significantly enhance their efficiency and effectiveness. For instance, some of these systems are capable of providing comprehensive hull protection with up to 60% fewer transducers compared to traditional models.

This reduction in the number of required transducers translates to fewer installation hours, lower installation costs, and reduced maintenance needs. Additionally, these advanced systems are designed to last up to 10 years with minimal maintenance, further optimizing their cost-effectiveness over their operational lifespan.

Ultrasonic antifouling spares you from dry-docking downtime by supporting longer intervals between maintenance sessions. You'll also spend less on hull cleaning services because the hull will stay clean for more extended periods.

Ready to see how much you can save with DragGone™?
Try the Fuel and Emission Impact calculator!

TRY THE CALCULATOR

Annual savings
$1,335,700
13% ↗

Regulatory and compliance issues

On Sept. 17, 2008, the International Convention on the Control of Harmful Antifouling Systems on Ships, sponsored by the International Maritime Organization (IMO), went into effect. The convention prohibited the use of harmful antifouling systems on ships, particularly ant-fouling paint containing the organotin compound tributyltin (TBT).

Organotin compounds and other biocides leach into ocean water and hamper the growth and sustenance of marine life. That's why the IMO passed this convention and has since made continuous amendments and added other compounds, including cybutryne, to the banned list.

Fortunately, ultrasonic antifouling systems don't contain biocides that can harm the marine ecosystem. Using ultrasonic solutions keep you compliant with changing environmental regulations in different regulatory zones because you don't risk toxic chemicals leaching into the water. If you decide to use antifouling paints alongside an ultrasonic system, make sure the paint meets all compliance standards in your jurisdiction.

Safety and environmental impact

Ultrasonic antifouling systems are chemical-free, meaning they're completely non-toxic. The marine industry's only concern is whether the noise levels of the ultrasonic waves affect the sonar navigation and behavior of marine mammals such as whales and dolphins.

An Cathelco-commissioned study to investigate this concern found that the noise levels of ultrasonic antifouling pose a low risk to marine mammals. This assertion qualifies Cathelco's ultrasonic systems as a marine-friendly antifouling solution.

Better still, ultrasonic solutions contribute directly to maritime sustainability goals just by keeping a ship's hull foul-free. A GloFouling study found that preventing a ship's hull from accreting just a thin layer of slime can reduce a ship's greenhouse gas emissions by about 25%. This is encouraging, considering that ultrasonic antifouling systems such as USP DragGone™ protect the hull from more than just a layer of slime.

Ask these key questions to get it right:

- **Safety:** does the ultrasonic antifouling system comply with all relevant maritime safety standards and regulations?
- **Certifications:** does the system hold any industry-specific certifications that validate its performance and safety?
- **Environmental impact:** what is the environmental impact of the system? does it comply with international environmental regulations?

Vendor selection and support

An ultrasonic antifouling system is only as reliable as its vendor. Because innovations in ultrasonic technology are still in high gear, you would want to work with an experienced provider.

Additionally, the ideal vendor should offer a complete hull protection suite of solutions, including ICCP systems, along with global after-sales support, a reasonable warranty, and user training to educate your deck officers on best-use practices and maintenance procedures. These offerings empower you and your crew to get maximum efficiency and service life from your ultrasonic system.

Ask these key questions to get it right:

- **How robust is the manufacturer's customer support and service network?**
- **How responsive is the manufacturer to customer feedback and product improvement requests?**
- **How financially stable is the manufacturer? Are they likely to be a reliable long-term partner?**
- **What is the reputation of the manufacturer in the maritime industry?**

Real-world applications of Cathelco's ultrasonic antifouling solution USP DragGone™

Superyacht MMM Trusts DragGone™ Ultrasonic Antifouling to Deliver Unparalleled Hull Protection

> Without the DragGone™ system, I'd expect the hull to look a lot like the other yachts here—barnacles and fouling everywhere. Seeing the hull clean while other boats are covered in marine growth is like night and day."
>
> **– Chief Engineer, Liam Worden, Superyacht MMM**

READ FULL ARTICLE

Chief Engineer Confirms USP DragGone™ as a Game-Changer in Antifouling Technology

> Cathelco's USP DragGone™ system is the first ultrasonic solution we've used that truly delivers on its promises. Unlike other systems that failed to prevent marine fouling, DragGone™ has consistently kept our hull clean. It's a game-changer for us, and we plan to include it in all future builds."
>
> **– Chief Engineer, 50-Meter Superyacht**

Future-proofing and technological advances

The growing emphasis on adopting maritime sustainability goals and the far-reaching environmental regulations on antifouling practices are fueling tech innovations in ultrasonic antifouling. Emerging trends in biofouling management include expanding ultrasonic system integrations with a vessel's onboard system to enhance operational efficiency.

Cathelco is at the forefront of tech innovation in maritime operations. In fact, Cathelco's ultrasonic antifouling system scooped the **2023 Technology of The Year award** at the Maritime Decarbonisation Awards in Amsterdam and the **2024 Innovation Award** at Ship Technology Excellence Awards.

Ask these key questions to get it right:

- **What is the manufacturer's roadmap for future updates and improvements to the ultrasonic antifouling system?**
- **How likely is it that this technology will become obsolete in the near future due to advancements in antifouling methods?**
- **Can the system be upgraded easily to incorporate new features or advancements in ultrasonic technology?**

We give you USP DragGone™: The future of ultrasonic antifouling

Cathelco's USP DragGone™ is the industry's most advanced ultrasonic antifouling solution, and it has proven results in different marine environments. We developed the USP DragGone™ to offer ship operators a quality antifouling system they can rely on for a decade or more.

The best part about the USP DragGone™ is that it does more than protect oceangoing vessels from harmful biofouling organisms. It also maximizes your fleet's overall operational efficiency. When you invest in this advanced ultrasonic antifouling solution, you enjoy less downtime doing hull cleaning, optimize your fleet's fuel consumption, and spend fewer resources on biofouling management.

But don't take our word for it. We want our product results to speak for us. Contact Cathelco today, and let us customize an ultrasonic antifouling solution for your fleet and witness our product's efficiency firsthand.

Cathelco®

Contact us for a custom quote or talk to our expert team to learn more about how DragGone™ can be tailored to your needs.

CONTACT SALES