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2017 European Marine Biocides Technology Innovation Award

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BEST
2017 PRACTICES
AWARD

EUROPEAN MARINE BIOCIDES
TECHNOLOGY INNOVATION AWARD

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Background and Company Performance

Industry Challenges

Fouling caused by organisms such as barnacles is a key problem faced by marine vessels at all times. It can be a particularly problematic issue for those vessels that are left dormant at ports for extended periods of time or operate at low speeds. In response, antifouling coatings are widely used in the marine industry for preventing the attachment of these organisms on ship hulls and submerged parts. Most marine antifouling coatings are formulated using biocides, which are chemical compounds that impede the growth of barnacles and other living organisms. The use of these biocides helps reduce the need for maintenance and repair to ships while also improving the dynamic performance of the vessel and reducing fuel usage.

Marine biocidal coating products, however, face numerous challenges to market growth and adoption in Europe. These include:

- A change in ship trading patterns increases risks of longer idling periods, increasing fouling pressure significantly.
- Increase in water temperatures causes more severe fouling conditions.
- Increased costs for fuel increases the need for reliable and high performing coatings no matter what conditions the ship may sail in.
- Invasive aquatic species is an issue, and today's coatings need a boost in performance to stay foul free.
- Some biocidal compounds can be toxic to the marine ecosystem and could lead to long-term environmental damage.
- Stringent environmental regulations in Europe, such as the Biocidal Product Regulation (BPR, (EU) 528/2012), restrict the use of biocides that are toxic to the environment. The number of alternative agents has been reduced from 20+ to 10 within a decade.

Overall, growing concerns about the environmental impact of using marine biocides has created high demand for a reduction in the metal oxides used in coatings and for non-metal options to be available to the market to help combat fouling with reduced toxic effect. Marine biocides should be flexible enough to integrate into any paint system, yet able to meet all regulatory standards set worldwide. Companies that develop and market marine biocides that meet the aforementioned requirements are expected to attain a strong position in the European marine biocides industry.

Identifying the prevailing challenges in the marine biocides industry, Sweden-based I-Tech AB (I-Tech) developed a novel organic, non-metallic biocide called Selektope® to combat barnacle attachment on submerged surfaces. Since the market debut of Selektope® in 2012, I-Tech has constantly updated its technology to enhance the product's durability and sustainability ensuring it remains ahead of competitors in the marine antifouling industry. Selektope® responds to the key challenges on a ship-efficiency perspective as

well as from a paint-technology perspective as it is compatible with most formulations and other active substances.

Technology Attributes and Future Business Value

Industry Impact

Made using the compound medetomidine, Selektope® binds to the barnacle larvae's octopamine receptor, temporarily stimulating a kicking response in the barnacles, and inducing them to start swimming instead of settling on ship hulls and other surfaces. According to laboratory test results medetomidine is 1,000 times more effective than conventional marine biocides in its action against barnacle settlement, and exhibits high performance over long periods of time. Frost & Sullivan recognizes that the use of a reversible pharmacological mode of action instead of toxicity to combat barnacle settlement is unique in the marine biocide industry, making Selektope® a standout technology that sets a new standard in the European market.

With I-Tech's vision to become a leader in supplying active biocidal agents for the marine antifouling paint industry, Selektope® must meet stringent regulatory standards set across regions. Therefore, the company has spent a great amount of its funding and research efforts towards receiving approval for the marine biocide technology according to the BPR in Europe, which it successfully achieved in January 2016. Regulatory approval in China, Japan, and Korea was previously granted over the course of the technology's development, making market introduction of Selektope® in Asia possible.

Visionary Innovation

Unlike competing marine biocides that work against a broad spectrum of marine organisms, Selektope® specifically targets barnacles. The fact that Selektope® can be used to either boost coatings that contain metal oxides, or replace the metal oxide component of coatings completely enables Selektope® to help in preserving the marine ecosystem over the long-term, making it extremely attractive for use in regions that focus on lessening the environmental impact from the maritime activities.

Frost & Sullivan finds that the long-term environmental and economic benefits derived from using Selektope® make it an innovative technology in the European marine biocide market, a solution with the potential to induce transformative change in the marine industry.

Scalability

When added to antifouling paint, Selektope® is effective at concentrations of only a few grams per litre. Very little biocide loading is therefore required to formulate antifouling coatings and paints, enabling paint makers to add other performance-enhancing compounds to their products.

I-Tech is able to produce multiple tons per year catering for all Selektope needs today and for future volume growth in the global marine environment. I-Tech has made important

inventions in the manufacturing and supply system, allowing the product to be supplied as per the market requirements.

Application Diversity

Antifouling paints containing Selektope® find application across a range of surfaces in marine vessels, including ship and boat hulls, propulsion systems, and marine installation devices. Maritime structures, which include bridges, docks, and piers, as well as submerged equipment, can also be protected from barnacle settlement using Selektope®. In Asia and Europe, Selektope® is mainly used in commercial shipping vessels. I-Tech is looking into alternative materials which would merit antifouling properties for various applications. The nature of Selektope may open routes that were previously not possible with high-loading antifouling coating alternatives.

I-Tech is also planning on targeting niche markets that are subjected to hard fouling but currently do not have any antifouling solutions available. These include cool water inlets in ship engines and aquaculture facilities. The range of marine vessels and equipment that can be protected with the help of Selektope® allows I-Tech to establish diverse usage of its propriety marine biocide in the marine environment.

Customer Acquisition

I-Tech's excellence in technology innovation poised to redefine the European marine biocides market has allowed the company to cater to many notable companies. For instance, Selektope® has been incorporated in 3 of the Japanese company Chugoku Marine Paints' (CMP) products, illustrating the flexibility of the technology in being compatible with different antifouling ingredients. As of June 2017, over 150 marine vessels, including liquefied natural gas (LNG) carriers, tankers, and container ships, have been painted using coatings incorporating Selektope®. Illustrating the company's ever-expanding customer base, in mid-2017 the Swedish company Stena RoRo signed a contract with I-Tech to treat the hulls of its newly built vessels with coatings incorporating Selektope®.

I-Tech works closely with paint manufacturers to develop customized paint formulations incorporating Selektope®. This strategy allows the company to leverage its in-house research and development (R&D) facilities to understand the end-properties required by its customers. With I-Tech open for any form of co-development project with paint makers and vessel builders, the company is expected to continue expanding its client base and solidify its position in the European marine biocides space. The company continuously conducts R&D initiatives to make sure its product is price-competitive with alternative antifouling solutions, while still maintaining its core value proposition of being environmentally responsible. Frost & Sullivan finds that these initiatives assist I-Tech in addressing any technical challenges Selektope® faces while enhancing its brand image among its growing customer base.

Financial Performance

I-Tech has invested significant amounts in developing a regulatory dossier, product capabilities and customer solutions to enable to reach market. Funding has partly been derived from grants but also from private equity. Returns of lengthy investments are starting to be experienced in a steady trend of sharp revenue growth.

Since the market introduction of Selektope® in 2015, the company has steadily witnessed a growth in revenue from sales of its proprietary technology. In fact, the number of coatings fortified by Selektope® in Q1 2017 is double that in Q1 2016, illustrating the fast-growing rate of the marine biocide's adoption. I-Tech expects that the numerous sales opportunities for Selektope® in new market areas will lead to a stellar increase in revenue for the company in the short-term.

Conclusion

I-Tech AB is one of the few companies in the European market to offer a sustainable marine biocide technology at cost-competitive prices on a commercial level. With rising concerns about preserving the marine ecosystem, Frost & Sullivan expects that the technology offers an alternative to, or can boost conventional metal-based marine biocides and become the trendsetter in the European marine biocides market in the coming years. The diverse range of vessel parts and marine applications that can be protected using Selektope® is far more extensive than the markets captured by competing technologies, illustrating I-Tech's superiority in the marine biocides industry.

With its strong overall performance, I-Tech AB has earned Frost & Sullivan's 2017 Technology Innovation Award.

Significance of Technology Innovation

Ultimately, growth in any organization depends upon finding new ways to excite the market and upon maintaining a long-term commitment to innovation. At its core, technology innovation, or any other type of innovation, can only be sustained with leadership in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Technology Innovation

Technology innovation begins with a spark of creativity that is systematically pursued, developed, and commercialized. That spark can result from a successful partnership, a productive in-house innovation group, or a bright-minded individual. Regardless of the source, the success of any new technology is ultimately determined by its innovativeness and its impact on the business as a whole.

Key Benchmarking Criteria

For the Technology Innovation Award, Frost & Sullivan analysts independently evaluated two key factors—Technology Attributes and Future Business Value—according to the criteria identified below.

Technology Attributes

- Criterion 1: Industry Impact
- Criterion 2: Product Impact
- Criterion 3: Scalability
- Criterion 4: Visionary Innovation
- Criterion 5: Application Diversity

Future Business Value

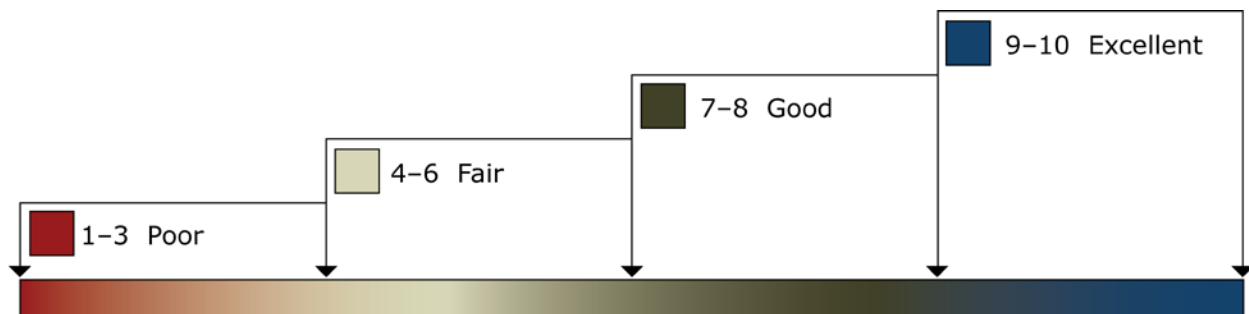
- Criterion 1: Financial Performance
- Criterion 2: Customer Acquisition
- Criterion 3: Technology Licensing
- Criterion 4: Brand Loyalty
- Criterion 5: Human Capital

Best Practices Award Analysis for I-Tech AB

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

RATINGS GUIDELINES



The Decision Support Scorecard is organized by Technology Attributes and Future Business Value (i.e., These are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key participants as Competitor 2 and Competitor 3.

<i>Measurement of 1–10 (1 = poor; 10 = excellent)</i>			
Technology Innovation	Technology Attributes	Future Business Value	Average Rating
I-Tech AB	9.6	9.4	9.5
Competitor 2	9.4	9.4	9.4
Competitor 3	8.8	9.0	8.9

Technology Attributes

Criterion 1: Industry Impact

Requirement: Technology enables the pursuit of groundbreaking ideas, contributing to the betterment of the entire industry.

Criterion 2: Product Impact

Requirement: Specific technology helps enhance features and functionalities of the entire product line for the company.

Criterion 3: Scalability

Requirement: Technology is scalable, enabling new generations of products over time, with increasing levels of quality and functionality.

Criterion 4: Visionary Innovation

Requirement: Specific new technology represents true innovation based on a deep understanding of future needs and applications.

Criterion 5: Application Diversity

Requirement: New technology serves multiple products, multiple applications, and multiple user environments.

Future Business Value

Criterion 1: Financial Performance

Requirement: Potential is high for strong financial performance in terms of revenues, operating margins, and other relevant financial metrics.

Criterion 2: Customer Acquisition

Requirement: Specific technology enables acquisition of new customers, even as it enhances value to current customers.

Criterion 3: Technology Licensing

Requirement: New technology displays great potential to be licensed across many sectors and applications, thereby driving incremental revenue streams.

Criterion 4: Brand Loyalty

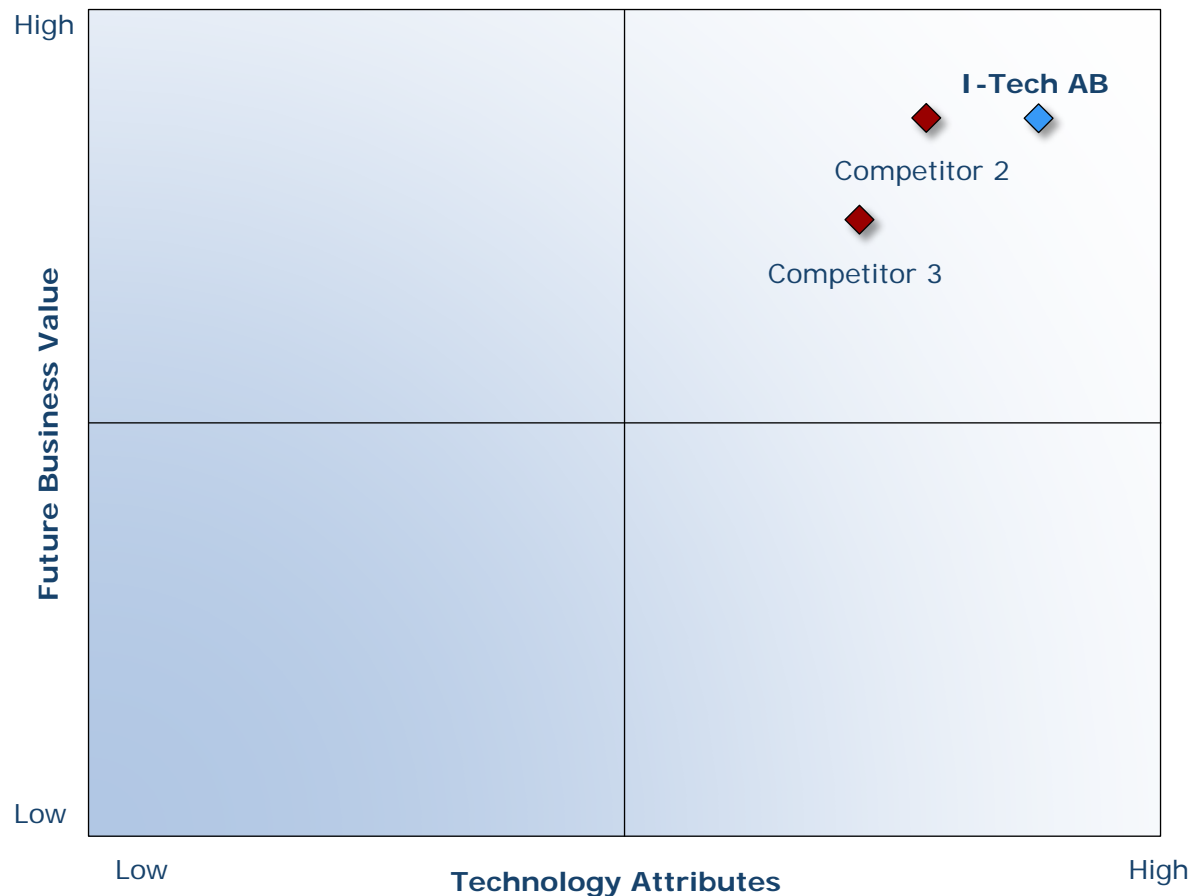
Requirement: New technology enhances the company's brand, creating and/or nurturing brand loyalty.

Criterion 5: Human Capital

Requirement: Customer impact is enhanced through the leverage of specific technology, translating into positive impact on employee morale and retention.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify Award recipient candidates from around the globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> • Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates 	Matrix positioning of all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> • Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> • Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles 	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> • Share findings • Strengthen cases for candidate eligibility • Prioritize candidates 	Refined list of prioritized Award candidates
6 Conduct global industry review	Build consensus on Award candidates' eligibility	<ul style="list-style-type: none"> • Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates 	Final list of eligible Award candidates, representing success stories worldwide
7 Perform quality check	Develop official Award consideration materials	<ul style="list-style-type: none"> • Perform final performance benchmarking activities • Write nominations • Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best-practice Award recipient	<ul style="list-style-type: none"> • Review analysis with panel • Build consensus • Select recipient 	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform Award recipient of Award recognition	<ul style="list-style-type: none"> • Present Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance 	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10 Take strategic action	Upon licensing, company is able to share Award news with stakeholders and customers	<ul style="list-style-type: none"> • Coordinate media outreach • Design a marketing plan • Assess Award's role in future strategic planning 	Widespread awareness of recipient's Award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.