2015 North American Radiation Detection New Product Innovation Award

Rhombus Power Inc.
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Background and Company Performance

Industry Challenges

Detection of even very low emissions of radiation from myriad sources has become a priority for a lot of personnel working in hazardous situations and locations worldwide. Radiation sources can be man-made or natural, accidental or deliberate, and the ability to detect not only the level of radiation but also its source is imperative in mission-critical tasks. There are several radiation detection instruments available in the market today. However, those that can detect very low levels and identify between sources are few. While several products in the industry offer both of these attributes, the cost and size of these instruments are prohibitive to be employed for several soldiers or first responders on these hazardous missions.

Another key challenge faced by vendors of radiation detection instruments is the availability of (or lack of) specific detection materials. The highly limited supply of helium-3, for example, has led to vendors looking for alternate materials and methods to provide equal or better detection results.

Statistics indicate that there are several hundreds of reported incidents of theft, unauthorized possession, or loss of nuclear material, as reported to the International Atomic Energy Agency (IAEA). However, few details are available on the undocumented instances, which could vary from a few incidents to several, that could pose a threat to safety and security worldwide.

New Product Attributes and Customer Impact of Rhombus Power Inc.

Rhombus Power’s Mercury Has Evolved

A multibillion-dollar industry globally, radiation detection is currently achieved using various technologies and products offered by key Tier I companies. From large portal monitors used by customs, border security officials, and the steel scrap industry across the world to small personal dosimeters, there are a variety of instruments available that have proven to have unstandardized accuracy and noise-level detection and often require frequent calibration.

Also, with the scarce availability of helium-3, the most commonly used material for neutron detection, there is an unprecedented need for new technologies and materials that can provide high accuracy levels at affordable costs.

In May 2014, Rhombus Power Inc., a start-up consisting of technologists bent on creating real-time solutions for real-world problems, worked to create a platform called "Mercury"
that can detect subatomic particles such as neutrons, X-rays, and gamma rays with a high level of accuracy. Also able to detect alpha and beta particles, “Mercury” was launched as being reliable, massively scalable, able to detect and eliminate noise, and also affordable for mass deployment.

With National Institute of Standards (NIST) verification of meeting ANSI standards under its belt, the Mercury found ready use among defense, homeland security, and such communities as a reliable detector of contraband nuclear weapons and material.

Not requiring frequent re-calibration and being free of false alarms, Mercury was first aimed at military, homeland security, and border security users. However, the commercial potential of this radiation detection instrument was not confined to these obvious potential customers. The company also views applications for digital neutron imaging for drug discovery and material sciences as the next organic markets for its Mercury product line.

**Mercury 3 Opens Up New Possibilities for More Effective Detection**

Since its launch, Rhombus Power has been continuously evolving the Mercury neutron detector range to add on to and scale up its capabilities. While all the key strengths of the detector—being extremely low-maintenance, free of false positives, and having high accuracy and low level of gamma or neutron detection—were maintained, the product line was extended to enable ease of use with zero start-up time and lower cost.

In addition, demonstrations to potential users showed the need for a smaller device with the same capabilities. Mercury 2 was already reduced to the size of a commercially available tablet. But the Mercury 3 was further enhanced and reduced in size to that of a handheld device closer to the size of a regular cell phone. The Mercury 3L is the size of a mini iPad, and the Mercury 3S is planned to be the size of the cell phone. These new versions of the product are touted to be at least 2.5 times more accurate than the available options in the same form factor, and they also include the geolocating facilities that are common in a regular mobile phone. With these capabilities, the Mercury 3 is also about 40% less expensive than the closest available detectors of the same size, offered by other companies.

**Understanding Customer Needs**

The company was quick to realize after the first launch of the Mercury product line that the demand for a smaller form factor is closely tied with a desire for better design and capabilities. This made the company go back to the drawing board and create the smaller-sized detectors. At the same time, the compact design does not compromise on wide area searches and can be modified into UAV, ground vehicle, and backpack modes.

There are several other radiation detection products of special nuclear materials available in the industry today. However, the ability to provide highly affordable technology that is easily scalable in wide area searches and in a combination of units that can be attached to
or flown in UAVs and aircrafts to small handheld units, is rare among the products available today.

The Mercury line of products offers the ability to detect thermal neutrons from special nuclear material (SNM) and gamma rays. These products can also image very faint radiation sources and can identify, locate, and characterize nuclear material even in cluttered environments. This enables support of nuclear threats, intelligence, surveillance, and reconnaissance (ISR) by gathering and analyzing data from multiple sources to form a coherent report.

**Design and Technology Are Key in Mercury’s Success**

Being semiconductor based and sensitive and having high accuracy are among the key factors that will ensure success of the Mercury line of instruments. In addition enabling long-range detection of special nuclear materials, such as weapons-grade plutonium (WGPu), enhance this product line’s accuracy in the detection of neutron and gamma rays through detector chips. The multiple form factors—from handheld instruments, including cell phones and tablet computers, to lightweight systems for UAV wide area searches, to medium-weight systems for aircraft and ground vehicles, to larger systems for ships and fixed portal monitors—make this product line unique.

**Exploding Potential Customer Categories**

First aimed at the US DoD and its related organizations, the Mercury line of nuclear radiation detection instruments could find first customers in applications from homeland security personnel to customs and border security. However, Rhombus Power is also looking to extend and use Mercury’s capabilities in utilities, industrial applications, and also medical detection applications in drug discovery and other new areas.

The Mercury platform can extend itself into handheld, backpack, vehicle mounted, small vehicle standoff detection (SVSD), rail monitors, cargo containers, standoff detection, and portal monitors. This flexibility in form factor is based on its semiconductor-based sensors and is unique among its competition.

**Partnerships with Future Competitors**

A small company in its current avatar, Rhombus Power is working continuously to get the attention of its key customers in the US government. Demonstrating its uniquely scalable Mercury platform, the company has also partnered with key industry players to further demonstrate its capabilities.

Recently, Rhombus partnered with Battelle, the largest nonprofit research and development organization globally, to jointly offer a Man-portable Radiation Detection System (MRDS) to the DoD. Battelle has world renown in offering a wide range of defenses for Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) weapons, and
the inclusion of the Mercury platform of solid-state nuclear detection further adds to Battelle’s impressive suite of solutions.

Previously, Rhombus was also working alongside potential future competitor Ametek, offering its unique sensors and the Mercury technology in its RPMs.

**Conclusion**

The flagship Mercury platform and the latest Mercury 3 range of subatomic particle detectors stand out among the radiation detection instruments available today. The wide area scalability, the multiple form factors, low maintenance, lack of false positives, highly sensitive combined neutron and gamma detector, and isotope discriminator that is also capable of gamma detection and imaging, all packaged in a cost-effective solution, are the main factors behind the recognition of Rhombus Power and its Mercury platform.

With the strong overall performance of its Mercury platform, Rhombus Power Inc. has earned Frost & Sullivan’s 2015 New Product Innovation Award in the radiation detection instrumentation market.
Significance of New Product Innovation

Ultimately, growth in any organization depends upon continually introducing new products to the market, and successfully commercializing those products. For these dual goals to occur, a company must be best-in-class in three key areas: understanding demand, nurturing the brand, differentiating from the competition. This three-fold approach to delivering New Product Innovation is explored further below.

Understanding New Product Innovation

Innovation is about finding a productive outlet for creativity—for translating ideas into high quality products that are of a consistently high quality and have a deep impact on the customer.
Key Benchmarking Criteria

For the New Product Innovation Award, we evaluated two key factors—New Product Attributes and Customer Impact—according to the criteria identified below.

New Product Attributes

- Criterion 1: Match to Needs
- Criterion 2: Reliability
- Criterion 3: Quality
- Criterion 4: Positioning
- Criterion 5: Design

Customer Impact

- Criterion 1: Price/Performance Value
- Criterion 2: Customer Purchase Experience
- Criterion 3: Customer Ownership Experience
- Criterion 4: Customer Service Experience
- Criterion 5: Brand Equity

Best Practice Award Analysis for Rhombus Power, Inc.

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 New Product Attributes and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criteria 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 players as Competitor 2 and Competitor 3.

### DECISION SUPPORT SCORECARD FOR NEW PRODUCT INNOVATION AWARD

<table>
<thead>
<tr>
<th>Measurement of 1–10 (1 = poor; 10 = excellent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Product Innovation</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Rhombus Power Inc.</td>
</tr>
<tr>
<td>Competitor 2</td>
</tr>
<tr>
<td>Competitor 3</td>
</tr>
</tbody>
</table>

**New Product Attributes**

**Criterion 1: Match to Needs**  
Requirement: Customer needs directly influence and inspire the product’s design and positioning

**Criterion 2: Reliability**  
Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle

**Criterion 3: Quality**  
Requirement: Product offers best-in-class quality, with a full complement of features and functionality

**Criterion 4: Positioning**  
Requirement: The product serves a unique, unmet need that competitors cannot easily replicate

**Criterion 5: Design**  
Requirement: The product features an innovative design, enhancing both visual appeal and ease of use

**Customer Impact**

**Criterion 1: Price/Performance Value**  
Requirement: Products or services offer the best value for the price, compared to similar offerings in the market

**Criterion 2: Customer Purchase Experience**  
Requirement: Customers feel like they are buying the most optimal solution that addresses both their unique needs and their unique constraints
Criterion 3: Customer Ownership Experience
Requirement: Customers are proud to own the company’s product or service, and have a positive experience throughout the life of the product or service

Criterion 4: Customer Service Experience
Requirement: Customer service is accessible, fast, stress-free, and of high quality

Criterion 5: Brand Equity
Requirement: Customers have a positive view of the brand and exhibit high brand loyalty

Decision Support Matrix
Once all companies have been evaluated according to the Decision Support Scorecard, analysts can 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.

DECISION SUPPORT MATRIX FOR NEW PRODUCT INNOVATION AWARD
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 players and for identifying those performing at best-in-class levels.
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Our awards team follows a 10-step process (illustrated below) to evaluate award candidates and assess their fit with our best practice criteria. The reputation and integrity of our awards process are based on close adherence to this process.

<table>
<thead>
<tr>
<th>STEP</th>
<th>OBJECTIVE</th>
<th>KEY ACTIVITIES</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Monitor, target, and screen</td>
<td>Identify award recipient candidates from around the globe</td>
<td>• Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies</td>
<td>Pipeline of candidates who potentially meet all best-practice criteria</td>
</tr>
<tr>
<td>2 Perform 360-degree research</td>
<td>Perform comprehensive, 360-degree research on all candidates in the pipeline</td>
<td>• Interview thought leaders and industry practitioners • Assess candidates’ fit with best-practice criteria • Rank all candidates</td>
<td>Matrix positioning all candidates’ performance relative to one another</td>
</tr>
<tr>
<td>3 Invite thought leadership in best practices</td>
<td>Perform in-depth examination of all candidates</td>
<td>• Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps</td>
<td>Detailed profiles of all ranked candidates</td>
</tr>
<tr>
<td>4 Initiate research director review</td>
<td>Conduct an unbiased evaluation of all candidate profiles</td>
<td>• Brainstorm ranking options • Involve multiple perspectives on candidates’ performance • Update candidate profiles</td>
<td>Final prioritization of all eligible candidates and companion best-practice positioning paper</td>
</tr>
<tr>
<td>5 Assemble panel of industry experts</td>
<td>Present findings to an expert panel of industry thought leaders</td>
<td>• Share findings • Strengthen cases for candidate eligibility • Prioritize candidates</td>
<td>Refined list of prioritized award candidates</td>
</tr>
<tr>
<td>6 Conduct global industry review</td>
<td>Build consensus on award candidates’ eligibility</td>
<td>• Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates</td>
<td>Final list of eligible award candidates, representing success stories worldwide</td>
</tr>
<tr>
<td>7 Perform quality check</td>
<td>Develop official award consideration materials</td>
<td>• Perform final performance benchmarking activities • Write nominations • Perform quality review</td>
<td>High-quality, accurate, and creative presentation of nominees’ successes</td>
</tr>
<tr>
<td>8 Reconnect with panel of industry experts</td>
<td>Finalize the selection of the best-practice award recipient</td>
<td>• Review analysis with panel • Build consensus • Select winner</td>
<td>Decision on which company performs best against all best-practice criteria</td>
</tr>
<tr>
<td>9 Communicate recognition</td>
<td>Inform award recipient of award recognition</td>
<td>• Present award to the CEO • Inspire the organization for continued success • Celebrate the recipient’s performance</td>
<td>Announcement of award and plan for how recipient can use the award to enhance the brand</td>
</tr>
<tr>
<td>10 Take strategic action</td>
<td>Share award news with stakeholders and customers</td>
<td>• Coordinate media outreach • Design a marketing plan • Assess award’s role in future strategic planning</td>
<td>Widespread awareness of recipient’s award status among investors, media personnel, and employees</td>
</tr>
</tbody>
</table>
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 almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.