2016 European Automotive Natural Fibre Composites New Product Innovation Award
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Background and Company Performance

Industry Challenges

The European automotive composite market has been growing at a rapid pace. With a definitive focus to reduce carbon-dioxide (CO₂) emissions to ensure a healthy, low-carbon economy, it is becoming quite imperative to design more fuel-efficient vehicles. Lightweight composite materials in vehicles hold great importance. Although glass fibre composites are dominantly used in the automotive industry, natural fibre composites are being increasingly used as well, as they allow for lighter weighting, deliver impressive performance, and also provide a superior environmental footprint. While natural fibre composites are witnessing substantial penetration in interior automotive applications, performance attributes such as strength, stiffness, and fire retardance remain key concerns.

Although there exists immense potential for natural fibre composites in automotive applications (such as door panels, seat backs, and dashboard panels), the challenges of using this material tend to outweigh the benefits. Despite a distinct set of advantages, including lightweight materials, cost efficiency, and environmental sustainability, Frost & Sullivan notes that these materials have specific issues that need to be addressed in order to improve the customer adoption rate. These issues include lower strength properties, tendency to absorb moisture, lower durability, poor fire resistance, and variations in quality due to erratic weather conditions. Developing innovative products that effectively outweigh these embedded challenges and assist in eliminating functional loopholes will position companies to create a clear competitive edge for themselves in the European automotive natural fibre composites market.

In addition to this, PP is the most commonly used resin type with natural fibers, and standards and testing protocols are well established. However, quality standards, testing procedures, and product certifications are not well established for natural fiber composites based on other resin types. Frost & Sullivan analysis confirms that this impacts the willingness of automotive Original Equipment Manufacturers (OEMs) to quickly adopt these materials into their vehicle models. This also results in the need for manufacturers to properly convince customers in the automotive industry regarding the material attributes and process ability of natural fibre composites based on non PP resins.

New Product Attributes and Customer Impact

Match to Needs

While Polypropylene (PP) remains the most commonly used resin with natural fibres, ELIX Polymers (a noted producer of ABS resins) introduced ELIX ECO ABS-NF thermoplastic — the first next-generation, natural fibre reinforced ABS. Frost & Sullivan notes that the superior attributes of ABS over PP include its heat stability and chemical resistance,
toughness and impact resistance, rigidity, as well as seamless process ability.

By understanding the unmet need in the natural fibre composites market, Frost & Sullivan applauds the fact that ELIX polymers has meticulously developed a product that addresses the key performance requirements within the automotive industry. As such, natural fibre composites based on ABS act as superior alternatives for automotive OEMs, enabling their usage across many applications that require high stability and enhanced aesthetics. Furthermore, by comprehending the increasing interest of automotive OEMs towards developing environmentally sustainable design solutions, ELIX Polymers’ ELIX ECO ABS-NF natural fibre reinforced ABS is able to facilitate the replacement of composites based on glass fibres across a number of interior automotive applications.

While it has been quite challenging for natural fibre composites to match the characteristic properties of glass fibre composites, ELIX ABS-NF has been designed to match these performance attributes. For instance, ELIX ABS-NF has a tensile modulus of 3,900 megapascal (MPa) as compared to the GF based ABS, where the various percentages of reinforcements feature a tensile modulus of 3,400 – 8000 MPa. Frost & Sullivan agrees that this is likely to steer OEM willingness to adopt ELIX ABS-NF in a number of GF applications, thereby enhancing their environmental footprint (without compromising on mechanical properties). ELIX has therefore developed its products while keeping in mind the dynamic needs of customers in the automotive industry.

**Positioning**

ABS-based natural fibre composites are strikingly different from PP-based natural fibre composites. Although their application areas might be similar, the technical processes of operating them tend to differ.

ELIX Polymers positions the ELIX ABS-NF as a material with ease-of-processability and a solution with a superior price-performance index as compared to traditional materials. For instance, ABS resins eliminate the need for a post-treatment operation while building the non-structural parts of a vehicle — unlike PP composites. With PP materials, one needs to undertake an additional process to provide a smooth, finished surface; this process is eliminated with the use of ABS resins. This helps enhance the visual appeal for the non-structural vehicle parts within interior applications.

Additionally, natural fibres do not have the capability to withstand extremely high temperatures due to their propensity to disintegrate. ELIX Polymers has identified this challenge and not only developed an ideal formulation of ABS resins and natural fibers, but has also focused on developing an impressive processing methodology to achieve a superior product with thermal stability. In addition to this, the environmental footprint of ELIX ECO ABS-NF provides the product with a clear competitive edge in the market. ELIX Polymers holds a superior position in sustainability by ensuring 10% reduction in energy consumption, 4% reduction in carbon footprint in manufacturing processes, along with a
23% reduction of the carbon footprint in transport and distribution. Frost & Sullivan points out that the sustainability benefits from the ELIX ECO ABS-NF testify to ELIX Polymers’ social commitment to building an eco-friendly atmosphere.

**Design**

ELIX ECO ABS NF has been specifically designed for non-structural, interior, and visible components in automotive. Focusing on providing enhanced aesthetics and touch and feel in components, the product can also be rendered in different colors based on the type of application. While the product is primarily designed for non-structural components, it has also been proven ideal for selected semi-structural applications by varying the fibre content in the formulation. Two grades of the product with high and low fibre content have been designed; the former can be used for semi-structural applications, while the latter is more suitable for non-structural parts requiring aesthetic importance.

One of the key design elements in the ELIX ECO ABS-NF is the fact that ABS requires higher temperatures for processing - while natural fibres tend to disintegrate at that temperature. ELIX Polymers has truly been successful in developing a conducive, compounding environment, so that the high temperature is applied to process ABS at the time of introducing the fibres; the temperature is then significantly reduced in order to obtain the ideal formulation. The design team has carefully considered the type of fibre, stabilizer, and process steps required to effectively address the processing challenge.

ELIX Polymers has in-house capabilities to manufacture ABS resins that provide freedom to vary resin formulation based on customer requirements. Furthermore, the company conducts the compounding techniques (for material extrusion) by itself, but is open to partnerships in order to augment its compounding processes. With a compounding plant located within its facility, the company has the ability of providing the production guidelines for these materials. For instance, ELIX Polymers collaborates with other companies in situations for development.

**Price/Performance Value**

The ELIX ECO ABS-NF thermoplastic product has helped the company to successfully reduce carbon footprints and offer customers a product that is comparatively lightweight, with a simple processability for injection purposes. ELIX Polymers has been quite successful in developing such a high-quality and cutting-edge product, which has ultimately positioned the company to acquire leading Tier-1 automotive OEMs as customers. To further optimize the performance quotient of its latest innovation, ELIX Polymers has ensured that it cohesively manages its production processes, right from the influx of raw materials to the load-release processes. The company also caters to the medical industry and therefore has a state-of-the-art quality control model that consists of four key aspects: incoming raw material monitoring, product control processes, lot release control, and production control.
The company has efficiently transformed similar quality measures to the automotive industry to ensure high quality standards for customers. In addition, conformance to these high quality standards acts as a key differentiator for ELIX Polymer’s products, with little customer skepticism on the higher price parameter. Customers readily accept the ELIX ECO ABS-NF’s benefits related to high stiffness, heat resistance, low moulding shrinkage ratios, low emissions, and weight reduction, when compared to glass-fibre-reinforced ABS. With a density of 1.12 grams per cubic centimeter (g/cm3) compared to 1.15 for ABS-GF, the ELIX ECO ABS-NF has unmatched product excellence. Also, the ELIX ECO ABS-NF has provided significantly impressive results (with regards to process ability and aesthetics) while being tested for 3D-printing technology. Also, while there are standardized directives for the technical use of polypropylene (PP) in natural fibre composites, the use of ABS resins in natural fibre composites remains fairly new among industry participants. Automotive OEMs are gradually starting to learn the comprehensive benefits that ABS offers. ELIX Polymer’s products provide impressive testimony for performance and quality attributes in ABS-based natural fibre composites for automotive applications.

Customer Service Experience

ELIX Polymers strongly believes in enhancing the customer experience by remaining in close proximity to clients in the product development process. The capability of the company to develop customized solutions is an inherent skill that defines its committed focus towards this customer value. Customization is facilitated through a team of experts (called TASKFORCE) that work in tandem with the Perfect Order Committee to satisfy the logistic needs of customers requiring specific solutions related to procurement. The company deploys lean startup principles to develop new materials and businesses and deliver successful and accurate results to customers. Furthermore, the company integrates its classic R&D with lean tools to deliver project management support.

In terms of offerings to the automotive industry, the company has remained at the forefront through a multi-dimensional approach delivering sustainability, product performance, and a high level of customization. In order to ensure close proximity to customer locations, the company has been focusing on expanding its global capabilities to meet global customer needs. ELIX Polymers opened an office and a hub warehouse to establish a strong position in the NAFTA region. The company aims to further strengthen its presence in the North American region to better understand and provide superior value to customers in the region.

The company also provides high-value technical support pertaining to tools as well as processes. It has acquired the title of being the fastest-response supplier for ABS in Europe, with a standard time of 28 days to produce a tailor-made product. In addition to this strategic approach of optimizing customer service, ELIX Polymers invites customer feedback and responses in order to implement them in its newest product offerings. The company is committed to deliver end-to-end services based on key factors - such as flexibility, proximity to customers, proactivity, global presence, and tailor-made services.
Brand Equity

Operating as an independent ABS producer in Europe, Spain-based ELIX Polymers is highly focused on rebranding its identity and leveraging its extensive customer network and 40 years of technical expertise to build an ELIX-branded ABS portfolio. Previously, it was a renowned subsidiary of Ineos — a global petrochemical company. As a part of its rebranding strategy, ELIX Polymers devised a communication plan that has helped with highlighting its customer collaborations.

Apart from its plan to deliver tailor-made solutions to customers, the company’s focus on the environment has gained it commendable recognition from its clients, competitors, and industry associates. The development of ELIX ECO-NF ABS was facilitated by the European Economic Area (EEA) and Norway Grants — which is a one-of-a-kind in the industry where a company was supported by a European Grant towards developing sustainable ABS materials and composites. Through this, ELIX Polymers has not only positioned itself as a leading supplier of eco-friendly ABS materials, but has also extended its commitment to develop an environmentally sustainable product portfolio.

The company aligns its product portfolio towards eco-friendly manufacturing, greater sustainability, and health impact awareness — all of which comprise its key objective. Proactive sustainability initiatives, a new product development focus, and a long-standing presence in the ABS market has provided ELIX Polymers with a leading position in the automotive industry and among its customers. In addition to its recent innovation in the natural fiber space, the company is also actively focusing on R&D activities to position itself as a key innovator in the automotive industry. As a result, the company has also been able to introduce bio-based ABS along with high heat ABS products for its automotive customers. By introducing a range of products, the company has not only been able to acquire customers (such as BMW), but has also been able to retain clients not only through its rigorous customization and product enhancement, but also through cost and productivity optimization support. Frost & Sullivan believes that ELIX Polymers has thus been able to establish a commendable position within the highly dynamic automotive industry.
Conclusion

ELIX Polymers, with its keen focus on sustainable innovation and continuous attempts to enhance customer value, has introduced the best-in-class ELIX ECO ABS-NF product. This product has delivered a high aesthetical value to the final ABS-NF molded parts, compared to PP-based natural fibre composites. The product’s mechanical properties have proven comparable to, or superior, in certain instances, to glass fibre composites. The product’s ease of process ability and reduced number of process steps have proven its success in the industry.

With its strong overall performance, ELIX Polymers has earned the 2016 Frost & Sullivan New Product Innovation Award.
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, and differentiating from the competition.

Understanding New Product Innovation

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

For the New Product Innovation Award, Frost & Sullivan analysts independently 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 ELIX Polymers

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>New Product Innovation</th>
<th>New Product Attributes</th>
<th>Customer Impact</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELIX Polymers</td>
<td>9.3</td>
<td>9.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Competitor 2</td>
<td>8.5</td>
<td>8.8</td>
<td>8.7</td>
</tr>
<tr>
<td>Competitor 3</td>
<td>8.5</td>
<td>8.1</td>
<td>8.3</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

![Decision Support Matrix Diagram]
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

Frost & Sullivan Awards 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.

<table>
<thead>
<tr>
<th>STEP</th>
<th>OBJECTIVE</th>
<th>KEY ACTIVITIES</th>
<th>OUTPUT</th>
</tr>
</thead>
</table>
| 1 Monitor, target, and screen | Identify Award recipient candidates from around the globe | • 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 | • Interview thought leaders and industry practitioners  
• Assess candidates’ fit with best-practice criteria  
• Rank all candidates | Matrix positioning all candidates’ performance relative to one another |
| 3 Invite thought leadership in best practices | Perform in-depth examination of all candidates | • 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 | • 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 | • 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 | • 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 | • 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 | • Review analysis with panel  
• Build consensus  
• Select winner | Decision on which company performs best against all best-practice criteria |
| 9 Communicate recognition | Inform Award recipient of Award recognition | • 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 may share Award news with stakeholders and customers | • 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 |
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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.