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Polyamide Resin based Composites in Automotive Market Report: Trends, Forecast and Competitive Analysis to 2030

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Abstracts

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Polyamide Resin based Composites in Automotive Trends and Forecast

The future of the global polyamide resin based composites in the automotive market looks promising with opportunities in the air intake main fold, air cooler end cap, radiator end cap, engine cover, auto connector, and auto switch markets. The global polyamide resin based composites in the automotive market is expected to grow with a CAGR of 3.8% from 2024 to 2030. The major drivers for this market are the rise in lightweighting initiatives for fuel efficiency and the increasing demand for electric vehicles.

> Lucintel forecasts that, within the product type category, short fiber reinforced thermoplastic will remain the largest segment over the forecast period.
>
> Within the application category, engine covers are expected to witness the highest growth.
>
> In terms of regions, APAC is expected to witness the highest growth over the forecast period.

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Emerging Trends in the Polyamide Resin based Composites in Automotive Market

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The polyamide resins-based composites in the automotive market are changing fast and this can be attributed to the efforts placed on performance enhancement, weight reduction, and sustainability. Several key trends are emerging that reflect these priorities.

Lightweighting and Making Cars More Fuel Efficient: In the automotive industry, manufacturers are increasingly favoring polyamide composites for vehicle weight reduction. These polyamide resins are very light but strong, thereby shrinking the mass of automobiles and increasing their fuel consumption efficiency. Such a trend is critical to attaining the emissions targets of countries and the pressure from consumers who are increasingly using fuel-saving cars. These polyamide composites are now being integrated into a wider Level of automotive applications which includes break and body, windows, and hood to reduce the total weight of the automobile.

Production of Bio and Recycled Feedstock Polymers: The ever-increasing demand for environmental concerns has made many producers develop new bio and recycled polyamide resins. This reduction of the resins will achieve a decrease in fossil fuel usage, and therefore assist in the development of a more circular economy within the automotive industry. Automotive manufacturers can produce polyamide materials without compromising the high performances expected in high-end applications by employing renewable and recycled feedstock in their production.

Reinforcement with Advanced Fibers: Polyamide resins are increasingly being reinforced with glass fibers, carbon fibers, and aramid fibers to obtain better performance. This enhancement increases the strength, stiffness, and impact resistance of polyamide composites making them viable for use in the structural parts and safety-critical components in vehicles. The advanced fibers also produce materials that are lighter but stronger, which help in the lightweighting trends of the automotive industry.

Focus on Operational Capabilities: New formulations are being developed to address the polyamide composite requirements of performance at high temperatures and high stress. In this regard, there are ongoing developments of polyamides that can withstand heat, are chemically stable, and have a stable shape that can be used for demanding automotive applications including under-hood and exhaust components. These advances, however, have made it

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possible for polyamides to be used in place of conventional metal, in many parts of vehicles enhancing efficiency by reducing weight.

Future of Electric Vehicle (EV) Applications: Polyamide resins find extended applications in automobiles due to the increasing adoption of electric vehicles. Since EVs are powered by electric propulsion, lightweight materials that can bear extreme heat and electrical stress are required. Polyamide composites are applied in battery cases of EVs, electric connection components, and polymer structural parts of EVs to manage the load demand, the degree of wear, and the heat dissipation. The electric mobility trend is thus stretching the performance envelope of polyamide resins, particularly catering to the needs of the EV industry.

The changes in the trends of using polyamide resin-based composites are revolutionizing the automotive industry aiming for lightweight, sustainable, and high-performance applications. These changes are also assisting the automakers to address the stringent regulation changes efficiently while enhancing the performance of the car's efficiency, safety, and environmental impact.

Recent Developments in the Polyamide Resin based Composites in Automotive Market

The polyamide resin-based composites in the automotive market have shown considerable changes and advances in the market that are affecting the design and manufacturing processes. These new materials are increasing the usability of polyamide composites for a wide range of automotive uses.

Advanced Methods of Manufacturing for New Age Polyamide Composites: There has been an improvement in the efficiency and quality of polyamide resins owing to the recent changes in production methods. Advanced techniques like extrusion and injection molding are helping manufacturers to make polyamide-based composites that are more consistent and efficient at a lesser cost than before. These advances are however used to satisfy the increasing demand of the automotive industry in terms of volume variances without high production costs.

Progress for Fiber Reinforced Polyamide Composites: The positive attributes of the polyamide resins are enhanced by including other fibers like glass and carbon fibers. Fabrics made from such materials find applications in structural

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components and other important automotive applications. Reinforced polyamide composites are enabling automotive manufacturers to cut weight and weight-induced operational costs significantly whilst maintaining operational safety and performance levels, which helps both fuel economy and car safety.

Use of Recycled and Bio-Based Polyamide Resins: There is an increase in the application of the adoption of recycled polyamide resins and bio-based polyamides in the automotive industry. Some companies have come up with the strategy of using monomers from recycled polyamide resins derived from products used by consumers and the fastest increasing bio-polyamides are made from renewable sources. Such measures are unsurprising due to the automotive industry's sustainability targets and the need to cut down carbon dioxide emissions.

Non-Metallic Advanced Technologies Composites for the Analysis, Simulation, and Testing Applications: New testing methods and simulation are assisting in different uses of polyamide composites in automotive applications. Such advancement allows manufacturers to tailor the chosen material properties and the material design in a more efficient way keeping in mind that the elements made using polyamide are subjected to extreme conditions like high temperature, vibrations as well as being immersed in some chemicals. These advances seem to be enhancing the polyamide composites utilization in critical automotive components.

Development Battlegrounds in Production of Polyamide Resins: To comply with the increasing polyamide composite demand in the automotive industry, manufacturers are increasing their production capacities. This increasing trend is a result of the growing demand for lightweight construction and more importantly composite for electric vehicles, safety, and structural composites. Also, the geographical expansion of polyamide production facilities is reducing costs as well as enhancing the availability of materials to automobile manufacturers.

These latest technologies of polyamide-based composites are laying the foundation for the future automotive design and production. From production improvements to adopting the new trendy materials, polyamide composites are likely to help meet the requirements of lightweight, safety, and, environmental concerns of the automotive industry.

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Strategic Growth Opportunities for Polyamide Resin based Composites in Automotive Market

Polyamide-based composites are gaining popularity in the automotive market, presenting several attractive strategic growth opportunities across major application areas. These opportunities help automobile manufacturers meet the increasing demands for weight reduction, safety, and environmental performance.

Lightweighting for Fuel Efficiency: The average fuel consumption of cars is a major concern for both manufacturers and consumers, with increasing attention being given to mechanisms that reduce emissions. Polyamide composites are being used in car engine parts and housings, where weight is critical. This demand for lightweight materials creates significant opportunities for polyamide composites in the automotive sector, especially in mass-market and electric vehicles.

Electric Vehicle Components: Electric vehicles (EVs) are growing rapidly, and this growth, in turn, drives the demand for polyamide consumables in battery casings, battery connectors, and other related parts. Polyamides are flexible, which is essential for automobile applications, and they also offer high security, which is crucial for automotive electrical drives, including those in electric cars. This growth area is becoming increasingly relevant as the trend toward vehicle electrification continues to rise.

Bio-Based Polyamide Resins: Bio-based polyamide resins are expected to gain substantial market share in the automotive industry as sustainability is embraced. These resins are produced from renewable resources, allowing for a reduction in the environmental impact of vehicle production without compromising the performance required for automotive applications. Many companies are now manufacturing bio-based polyamide resins, which is beneficial to them, especially as environmental regulations become stricter.

Advanced Reinforced Composites for Safety and Longevity: Reinforced composites made with polyamide, particularly those with glass or carbon fibers, are gaining traction in-vehicle applications where impact strength, durability, and resistance are paramount. These composites are used in critical areas like crash zones, under-the-hood parts, and chassis reinforcement. The use of reinforced polyamide composites in structurally sensitive parts of vehicles, such as body

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panels, provides significant opportunities for developing safer seat structures.

Expanding into Emerging Markets: The greatest opportunities for the use of polyamide composites in automotive applications lie in emerging markets, particularly in Asia and South America. With increasing disposable income and rising demand for vehicles, carmakers in these regions are increasingly adopting cost-effective, lightweight materials like polyamides to enhance fuel economy and improve vehicle safety.

These growth opportunities suggest that polyamide resin-based composites in the automotive market are poised to make a significant contribution to lightweighting, sustainability, and high-performance applications in the automotive industry. The growing EV market, bio-based resins, and reinforced composite construction materials will drive this development forward.

Polyamide Resin based Composites in Automotive Market Driver and Challenges

The polyamide resin-based composites in the automotive market are characterized by various drivers and challenges that influence the direction of their growth.

The factors responsible for driving polyamide resin-based composites in the automotive market include:

Demand for Lightweight Materials: Automakers are constantly searching for opportunities to reduce the weight of vehicles for better fuel consumption and emission reduction. Polyamide-based composites are essential in achieving these objectives, as they are light, durable, and strong without the added weight of metals.

Technological Advancements in Polymer Blends: New technologies in polymer blends and composites are enhancing the properties of polyamide resins, making them suitable for a broader range of automotive applications, from structural components to interior parts.

Growth of Electric Vehicles: The demand for polyamide composites in electric vehicles is increasing due to the need for small-scale, heat-resistant, and electrically insulative materials for battery packs, wires, and connectors.

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Environmental Regulations: Stricter global regulations concerning fuel consumption and exhaust toxicity are encouraging automobile manufacturers to use polyamide composites and other lightweight materials to create more fuel-efficient vehicles.

Focus on Sustainability: The increased consumer demand for sustainable alternatives is also driving the formulation of bio-based and recycled polyamide. This trend aligns with the automotive industry's efforts to minimize its climate impact.

Challenges in the polyamide resin-based composites in the automotive market are:

High Production Costs: To compete at scale, polyamide resins, including reinforced and bio-based types, have high production costs compared to other materials, limiting their use in many low-cost automotive markets.

Raw Material Supply Chain Issues: Polyamide production requires specific raw materials, so supply chain disruptions can lead to scarcity, delays, or increased production costs.

Performance in Extreme Conditions: The mechanical performance of polyamide composites, especially when reinforced with polyurethane plastics, is effective, but extreme conditions in the automotive industry, such as high temperatures and exposure to chemicals, limit their applicability. Addressing this challenge is crucial for expanding the use of polyamide composites.

Polyamide resin-based composites are poised to penetrate the automotive market due to the growing demand for weight reduction, among other factors. However, to realize the full potential of this emerging sector, challenges such as high production costs and supply chain barriers must be addressed.

List of Polyamide Resin based Composites in Automotive Companies

Companies in the market compete on the basis of product quality offered. Major players in this market focus on expanding their manufacturing facilities, R&D investments, infrastructural development, and leverage integration opportunities across the value chain. Through these strategies polyamide resin based composites in automotive

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companies cater increasing demand, ensure competitive effectiveness, develop innovative products & technologies, reduce production costs, and expand their customer base. Some of the polyamide resin based composites in automotive companies profiled in this report include-

BASF

DSM

DuPont

LANXESS

Solvay

Polyamide Resin based Composites in Automotive by Segment

The study includes a forecast for the global polyamide resin based composites in automotive by product type, resin type, application, and region.

Polyamide Resin based Composites in Automotive Market by Product Type [Analysis by Value from 2018 to 2030]:

Short Fiber Reinforced Thermoplastic

Long Fiber Reinforced Thermoplastic

Continuous Fiber Reinforced Thermoplastic

Polyamide Resin based Composites in Automotive Market by Resin Type [Analysis by Value from 2018 to 2030]:

Polyamide6

Polyamide66

Polyamide46

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Others

Polyamide Resin based Composites in Automotive Market by Application [Analysis by Value from 2018 to 2030]:

Air Intake Main Fold

Air Cooler End Caps

Radiator End Caps

Engine Cover

Auto Connectors

Auto Switches

Polyamide Resin based Composites in Automotive Market by Region [Analysis by Value from 2018 to 2030]:

North America

Europe

Asia Pacific

The Rest of the World

Country Wise Outlook for the Polyamide Resin based Composites in Automotive Market

The polyamide resin-based composites have excellent characteristics such as high strength, heat resistance, and low weight. Polyamide resins, or nylon 6 and nylon 66, have become essential in the automotive sector. This is particularly true as the automotive industry shifts towards producing lighter and more efficient vehicles that comply with stringent carbon emission standards. Countries like the U.S., China,

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Germany, India, and Japan are the early adopters of polyamide composites for automotive applications, with new trends and design systems emerging, such as under-the-hood parts, interior systems, and exterior components. This trend is attributed to the demand for reducing vehicle weight, electrification, and sustainability.

United States: Polyamide-based composites are increasingly used in the U.S. automotive sector as they contribute to the goal of creating weight-saving and fuel-efficient vehicles. These materials are particularly useful in light-weighting cars because they save significant weight without compromising strength or durability. In the U.S., polyamide resins are used in components such as engine covers, air intake manifolds, and some interior parts, made from nylon 66. This is driven by stringent fuel economy standards and the customers' desire for greener alternatives. Furthermore, polymer blends and reinforcements, including glass fibers, are improving the mechanical properties of polyamide composites and making them suitable for critical functions within the automotive industry.

China: The use of polyamide-based composites is gaining acceptance in China’s automotive industry, especially as the quest for lower-weight and higher energy-efficient vehicles increases. To achieve weight reduction and improve fuel efficiency, manufacturers are using polyamide resins in both interior and structural components, such as door modules, instrument panels, and engine parts. China is also working towards enhancing the quality and functionality of polyamide composites used in automotive applications through advanced fiber-reinforcing techniques. Additionally, as concerns about environmental pollution rise, the exploration of bio-based polyamides in the Chinese marketplace is increasing. This supports China’s sustainability strategy while enhancing market competitiveness in composite materials for the automotive sector.

Germany: Known for its advanced automotive technology, Germany is a leader in the use of polyamide composites in the automotive field, both in terms of enhancing vehicle performance and contributing to sustainability. German automakers are incorporating polyamide resins in engine parts, connectors, and body panels to improve fuel economy through weight reduction. This is supported by the country’s continuous use of high-performance materials, as shown in the structural and safety components where glass and carbon fiber-reinforced polyamides are utilized. Similar to green policies adopted in other European countries, German manufacturers have positioned themselves at the forefront of bio-polyamide composite innovation in their quest to reduce environmental pollution without compromising performance and durability.

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India: The automotive industry in India has quickly adopted polyamide composite manufacturing processes to meet the growing demand for energy-saving and low-cost vehicles. Engine covers, bumpers, and dashboards are among the components that use polyamide resins. In India, the focus is on enhancing the affordability of polyamide composites through cost-effective production engineering and reinforcement with glass fibers for improved mechanical properties. The country is also moving towards greater self-sufficiency in polyamide resin production, reducing reliance on imports. Moreover, the Indian automotive industry is leveraging polyamide composites to meet new safety and environmental regulations, making this material crucial for the design of future vehicles.

Japan: Japan has always been at the forefront of advanced automotive technology, and polyamide composites for lightweight and improved vehicle performance are widely adopted in the country. Polyamide resins used by Japanese auto manufacturers are applied in various components, from chassis reinforcements to interior parts such as trim and seats. Japanese companies are also working on improving the heat and dimensional stability of polyamide composites, which are essential features in the automotive sector. Furthermore, many Japanese firms are engaged in developing recyclable polyamide resins and composites, demonstrating the nation's commitment to environmental conservation and sustainable production in the automotive industry.

Features of the Global Polyamide Resin based Composites in Automotive Market

Market Size Estimates: Polyamide resin based composites in automotive market size estimation in terms of value ($B).

Trend and Forecast Analysis: Market trends (2018 to 2023) and forecast (2024 to 2030) by various segments and regions.

Segmentation Analysis: Polyamide resin based composites in automotive market size by product type, resin type, application, and region in terms of value ($B).

Regional Analysis: Polyamide resin based composites in automotive market breakdown by North America, Europe, Asia Pacific, and Rest of the World.

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Growth Opportunities: Analysis of growth opportunities in different product type, resin type, application, and regions for the polyamide resin based composites in automotive market.

Strategic Analysis: This includes M&A, new product development, and competitive landscape of the polyamide resin based composites in automotive market.

Analysis of competitive intensity of the industry based on Porter's Five Forces model.

If you are looking to expand your business in this or adjacent markets, then contact us. We have done hundreds of strategic consulting projects in market entry, opportunity screening, due diligence, supply chain analysis, M & A, and more.

This report answers following 11 key questions:

Q.1. What are some of the most promising, high-growth opportunities for the polyamide resin based composites in automotive market by product type (short fiber reinforced thermoplastic, long fiber reinforced thermoplastic, and continuous fiber reinforced thermoplastic), resin type (polyamide6, polyamide66, polyamide46, and others), application (air intake main fold, air cooler end caps, radiator end caps, engine cover, auto connectors, auto switches, and others), and region (North America, Europe, Asia Pacific, and the Rest of the World)?

Q.2. Which segments will grow at a faster pace and why?

Q.3. Which region will grow at a faster pace and why?

Q.4. What are the key factors affecting market dynamics? What are the key challenges and business risks in this market?

Q.5. What are the business risks and competitive threats in this market?

Q.6. What are the emerging trends in this market and the reasons behind them?

Q.7. What are some of the changing demands of customers in the market?

Q.8. What are the new developments in the market? Which companies are leading these developments?

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Q.9. Who are the major players in this market? What strategic initiatives are key players pursuing for business growth?

Q.10. What are some of the competing products in this market and how big of a threat do they pose for loss of market share by material or product substitution?

Q.11. What M&A activity has occurred in the last 5 years and what has its impact been on the industry?

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