

United States Thermal Spray Coatings Market, By Material (Ceramic Oxide, Carbides, Metals, Polymer, Others), By End User Industry (Automotive, Aerospace, Energy & Power, Electronics, Oil and Gas, Others), By Region, Competition, Forecast and Opportunities, 2019-2029F

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Abstracts

United States Thermal Spray Coatings Market was valued at USD 1.52 billion in 2023 and is anticipated to project steady growth in the forecast period with a CAGR of 4.75% through 2029. The thermal spray adhesives market in the United States has experienced substantial growth in recent years, fueled by increasing demand across various industries for advanced adhesion solutions. These adhesives, also known as thermal spray coatings, are instrumental in improving surface performance, durability, and reliability, particularly in harsh conditions. Utilizing a specialized coating process involving heating and propelling materials onto surfaces using a thermal spray gun, these adhesives create resilient and protective coatings. They find applications across diverse industries, from corrosion resistance to enhancing thermal insulation. The outlook for the thermal spray adhesives market appears promising, driven by ongoing technological advancements and a growing emphasis on sustainability. As industries continue to seek dependable and long-lasting surface protection solutions, the demand for thermal spray adhesives is expected to increase.

Key Market Drivers

Growing Industrialization

The rise of industrialization, marked by expanded manufacturing, infrastructure

advancement, and economic progress, is profoundly influencing the demand trends for thermal spray coatings. As countries pursue economic growth, there's a concurrent imperative to ensure the reliability and endurance of industrial components operating under demanding conditions. Sectors like manufacturing, automotive, and energy are experiencing a surge in thermal spray coatings demand to enhance the performance and resilience of crucial parts. With escalating production levels and operational requirements, there's a pressing need for innovative surface protection solutions against wear, corrosion, and extreme temperatures. In the United States, the manufacturing sector plays a significant role in the economy, contributing to 10.70% of the total output in the country. This sector also employs 8.41% of the workforce, indicating its importance in providing employment opportunities. The total output from manufacturing reached USD 2.5 trillion in 2021, highlighting its substantial economic value. Moreover, the sector sustained an average of 12.5 million manufacturing employees in December 2021, underlining its significant workforce size. These employees received an average annual compensation of \$95,990.00 in 2021, reflecting the sector's role in providing competitive wages and benefits to its workforce. These points serve as key indicators of the strength and vitality of the United States Market, showcasing the robustness of the manufacturing sector and its potential for growth and innovation.

Moreover, the industrialization wave is driving a heightened emphasis on boosting operational efficiency. Thermal spray coatings emerge as pivotal in this pursuit, offering cost-effective and effective means to prolong machinery and component lifespans. Industries are increasingly recognizing the long-range advantages of investing in advanced coating technologies to minimize downtime, curtail maintenance expenses, and elevate overall equipment efficacy. In response to this industrial transformation, players in the thermal spray coatings sector are strategically positioning themselves to cater to the escalating demand. Through the adoption of state-of-the-art technologies and ongoing research and development endeavors, industry is enhancing its ability to address the evolving requisites of industrialization.

Technological Advancements

Continuous advancements in thermal spray technologies are serving as a key driver for market expansion. Progress in materials, application techniques, and equipment is broadening the capabilities of thermal spray coatings, addressing a wider range of industrial requirements. Whether in aerospace, energy, automotive, or other sectors, the adaptability of thermal spray coatings is enhanced by innovations in plasma spraying, high-velocity oxy-fuel spraying (HVOF), and cold spraying methods. Industries like

aerospace and automotive are experiencing significant transformations due to these advancements. Breakthroughs in thermal barrier coatings, corrosion-resistant coatings, and wear-resistant coatings are empowering aircraft components and automotive parts to endure harsh conditions, thus improving operational efficiency and extending their lifespan. Additionally, the pursuit of environmentally friendly coating materials and processes is aligning the thermal spray coatings market with sustainability objectives. As global industries increasingly prioritize environmental responsibility, the demand for eco-friendly and energy-efficient solutions is propelling research and development efforts in the thermal spray coatings sector.

Need for Surface Protection

Industries across manufacturing, energy, automotive, and aerospace are experiencing a notable uptick in the adoption of thermal spray coatings, primarily driven by the crucial need to shield vital components from degradation and deterioration. The total annual estimated direct cost of corrosion in the United States is significant, amounting to \$276 billion, which represents approximately 3.1% of the nation's Gross Domestic Product (GDP). This substantial financial impact underscores the economic implications of corrosion across various sectors and industries. Thus the increasing demand for surface protection stems from the persistent challenges posed by harsh operating conditions, which, if unaddressed, could jeopardize the reliability and effectiveness of industrial equipment. Thermal spray coatings have emerged as a cornerstone in the quest for comprehensive surface safeguarding. Employing advanced techniques like plasma spraying and high-velocity oxy-fuel spraying, these coatings form a durable barrier that fortifies surfaces against environmental stressors and the effects of aging. Take, for instance, the oil and gas industry, where pipelines coated with thermal spray materials demonstrate enhanced resistance to corrosion, ensuring the smooth flow of energy resources without interruptions. Moreover, the imperative for surface protection is intricately linked to the pursuit of operational excellence. Industries recognize that investing in advanced coating solutions isn't just a precautionary measure but a strategic necessity. Thermal spray coatings mitigate downtime, reduce maintenance expenditures, and prolong the operational lifespan of critical machinery, thereby elevating overall operational efficiency.

Key Market Challenges

High Initial Investments

At the core of this issue lies the intricate and specialized nature of thermal spray

technology. The process necessitates cutting-edge equipment, such as thermal spray guns, robotic systems, and spray booths, which collectively entail a significant upfront investment. For smaller businesses with constrained financial resources, this financial commitment can pose a barrier, hindering their ability to leverage the advantages of thermal spray coatings to reinforce their industrial assets. The initial investment encompasses not just procuring specialized machinery but also covering the costs of training personnel to operate the equipment proficiently. Given the complex nature of thermal spray processes, skilled professionals are essential, and the associated training programs can further strain the financial resources of businesses aiming to adopt thermal spray applications. Furthermore, the challenge is compounded by the requirement for a dedicated workspace furnished with adequate ventilation systems and safety protocols. Establishing such a compliant environment demands additional investment, augmenting the overall entry costs into the thermal spray coatings market. While larger enterprises may absorb these initial expenses more readily, for smaller players or those with tighter budgets, the financial barrier becomes a significant obstacle. This not only restricts market access but also potentially hampers innovation and diversity within the thermal spray coatings industry.

Complexity of Technology

The intricate procedures involved in thermal spray coatings, including methods like plasma spraying and high-velocity oxy-fuel spraying, require a high level of proficiency for effective implementation. This complexity not only acts as a barrier for newcomers but also poses ongoing difficulties for companies aiming to expand their thermal spray operations. Moreover, the diverse array of thermal spray materials, each tailored for specific applications, adds another layer of complexity. Selecting the appropriate material necessitates a nuanced understanding of desired coating properties, environmental conditions, and substrate characteristics. This intricacy renders the technology less accessible for industries lacking in-house experts or dedicated research and development teams. Additionally, the ever-evolving landscape of thermal spray technologies introduces a dynamic element to the market. Keeping pace with the latest advancements, embracing new materials, and integrating cutting-edge techniques into existing processes become essential. For businesses, this continual learning curve entails substantial investments in research and development, training initiatives, and equipment upgrades.

Key Market Trends

Focus on Environmental Sustainability

As industries worldwide confront the necessity of reducing their environmental impact, thermal spray coatings are emerging as a valuable ally in this pursuit. Conventional surface coating methods often involve the use of materials and processes that harm the environment. In contrast, thermal spray coatings offer a more eco-friendly option, fostering a cleaner and more sustainable industrial environment. A primary way in which thermal spray coatings support sustainability objectives is through the adoption of environmentally friendly coating materials. Companies in the market are increasingly investing in the development of coatings that minimize environmental harm while maintaining performance standards. This transition not only addresses regulatory requirements but also aligns with the growing awareness and demand for sustainable practices among consumers and businesses. Additionally, the thermal spray coatings market is experiencing advancements in energy-efficient coating processes. Manufacturers are exploring techniques that reduce energy consumption during coating application, thus promoting sustainability and resource efficiency within the industry. This not only supports corporate social responsibility efforts but also positions thermal spray coatings as a responsible choice for environmentally conscious businesses.

Rising Demand for High Performance Coatings

Thermal spray technologies have become indispensable for sectors like aerospace, automotive, energy, and manufacturing, facilitating the creation of high-performance coatings. These coatings offer unmatched resistance to wear, corrosion, and high temperatures, making them the preferred solution for industries facing the challenges of demanding operating conditions. In the aerospace industry, where components endure extreme conditions during flight, the demand for thermal spray coatings has surged. Critical parts such as turbine blades and engine components benefit from the protective shield provided by these coatings, enhancing overall performance and extending aircraft component lifespans. Similarly, the automotive sector is capitalizing on the benefits of high-performance thermal spray coatings to achieve improved fuel efficiency, lower maintenance costs, and prolonged component lifespans. From engine components to exhaust systems, these coatings are instrumental in optimizing automotive performance and longevity. In the energy sector, encompassing power generation and oil and gas industries, thermal spray coatings are essential for protecting vital components from corrosion, erosion, and thermal stress. As energy demand in the United States continues to grow, the necessity for high-performance coatings capable of withstanding the rigors of energy production becomes increasingly paramount.

Segmental Insights

End User Industry Insights

Based on end user industry, automotive industry dominated the United States Thermal Spray Coatings Market. The automotive industry stands at the forefront of leveraging thermal spray coatings to enhance performance and longevity. Components such as engine parts, pistons, and exhaust systems are subjected to extreme conditions. Thermal spray coatings, often composed of metals or ceramics, provide a protective layer against wear, corrosion, and thermal stress, contributing to increased fuel efficiency and reduced maintenance costs. In the aerospace sector, where precision and reliability are paramount, thermal spray coatings play a pivotal role. Turbine blades, combustion chambers, and other critical components are subjected to extreme temperatures and harsh environments. Thermal barrier coatings, often composed of ceramic materials, provide thermal insulation and protect against corrosion, ensuring the durability and efficiency of aerospace components. The energy and power industry relies on thermal spray coatings for the protection of critical components in power plants and renewable energy infrastructure. Components exposed to high temperatures, such as boiler tubes and gas turbine blades, benefit from coatings that enhance resistance to corrosion and erosion. In the renewable energy sector, thermal spray coatings contribute to the longevity of wind turbine components, ensuring sustainable energy production. In the electronics industry, where precision meets miniaturization, thermal spray coatings find applications in coating electronic components. Polymers and ceramics are often used to provide insulation, protection against environmental factors, and enhance the performance of electronic devices. Thermal spray coatings contribute to the reliability of electronic components in various applications.

Regional Insights

Based on region, Midwest dominated the United States Thermal Spray Coatings Market. This is due to the robust industrialization and infrastructure development witnessed across the region. As nations invest heavily in expanding their industrial capacities, the demand for advanced surface protection technologies, such as thermal spray coatings, has witnessed an unprecedented surge. Industries ranging from automotive and aerospace to energy and manufacturing are leveraging thermal spray coatings to enhance the durability and performance of critical components. The automotive sector in Midwest, which is experiencing exponential growth, is a major consumer of thermal spray coatings. As the automotive industry in countries like China and India continues to expand, the need for coatings that provide corrosion resistance, thermal insulation, and wear protection is escalating. Thermal spray coatings, with their

ability to meet these requirements, have become integral to the manufacturing processes in the region. In the aerospace industry, particularly in countries like Japan, where technological advancements are synonymous with innovation, thermal spray coatings are witnessing increased adoption. These coatings play a vital role in protecting aerospace components subjected to extreme conditions, contributing to the efficiency and longevity of aircraft and spacecraft. The Midwest region's focus on renewable energy initiatives has also propelled the demand for thermal spray coatings. As countries invest in wind energy projects, the coatings are essential for protecting wind turbine components from environmental stressors, contributing to sustainable energy production.

The Midwest region is a hub for technological innovation and research. Ongoing developments in material science, application techniques, and coating technologies are enriching the thermal spray coatings market. Collaborations between research institutions, government bodies, and industry players are fostering an environment conducive to advancements in the field.

Key Market Players

APS Materials Inc

Hannecard Roler Coatings, Inc. (ASB Industries Inc.)

Bodycote PLC

Chromalloy Gas Turbine LLC

Eurocoating SpA

FM Industries Inc.

FW Gartner Thermal Spraying Ltd. (Curtis-Wright)

Kennametal Inc.

Oerlikon Management AG

Praxair S.T. Technology, Inc.

Report Scope:

In this report, the United States Thermal Spray Coatings Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

United States Thermal Spray Coatings Market, By Material:

Ceramic Oxide

Carbides

Metals

Polymer

Others

United States Thermal Spray Coatings Market, By End User Industry:

Automotive

Aerospace

Energy and Power

Electronics

Oil and Gas

Others

United States Thermal Spray Coatings Market, By Region:

West

Midwest

Northeast

South

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the United States Thermal Spray Coatings Market.

Available Customizations:

United States Thermal Spray Coatings market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Sources
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, Trends

4. IMPACT OF COVID-19 ON UNITED STATES THERMAL SPRAY COATINGS MARKET

5. UNITED STATES THERMAL SPRAY COATINGS MARKET OUTLOOK

- 5.1. Market Size & Forecast
 - 5.1.1. By Value
- 5.2. Market Share & Forecast
 - 5.2.1. By Material (Ceramic Oxide, Carbides, Metals, Polymer, Others)
 - 5.2.2. By End User Industry (Automotive, Aerospace, Energy & Power, Electronics, Oil and Gas, Others)

- 5.2.3. By Region
- 5.2.4. By Company (2023)
- 5.3. Market Map

6. WEST UNITED STATES THERMAL SPRAY COATINGS MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value
- 6.2. Market Share & Forecast
 - 6.2.1. By Material
 - 6.2.2. By End User Industry

7. NORTHEAST UNITED STATES THERMAL SPRAY COATINGS MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Material
 - 7.2.2. By End User Industry

8. MIDWEST UNITED STATES THERMAL SPRAY COATINGS MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value
- 8.2. Market Share & Forecast
 - 8.2.1. By Material
 - 8.2.2. By End User Industry

9. SOUTH UNITED STATES THERMAL SPRAY COATINGS MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value
- 9.2. Market Share & Forecast
 - 9.2.1. By Material
 - 9.2.2. By End User Industry

10. MARKET TRENDS & DEVELOPMENTS

- 10.1. Recent Developments
- 10.2. Product Launches
- 10.3. Mergers & Acquisitions

11. UNITED STATES THERMAL SPRAY COATINGS MARKET: SWOT ANALYSIS

12. PORTER'S FIVE FORCES ANALYSIS

- 12.1. Competition in the Industry
- 12.2. Potential of New Entrants
- 12.3. Power of Suppliers
- 12.4. Power of Customers
- 12.5. Threat of Substitute Product

13. PESTLE ANALYSIS

14. COMPETITIVE LANDSCAPE

- 14.1. APS Materials Inc
 - 14.1.1. Business Overview
 - 14.1.2. Company Snapshot
 - 14.1.3. Products & Services
 - 14.1.4. Financials (As Reported)
 - 14.1.5. Recent Developments
- 14.2. Hannecard Roller Coatings, Inc.(ASB Industries Inc.)
- 14.3. Bodycote PLC
- 14.4. Chromalloy Gas Turbine LLC
- 14.5. Eurocoating SpA
- 14.6. FM Industries Inc.
- 14.7. FW Gartner Thermal Spraying (Curtis-Wright)
- 14.8. Kennametal Inc.
- 14.9. Oerlikon Management AG
- 14.10. Praxair S.T. Technology, Inc.

15. STRATEGIC RECOMMENDATIONS

16. ABOUT US & DISCLAIMER

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