

Report Information

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Space Propulsion Systems Market Research Report - Global Forecast till 2032

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Description:

Global Space Propulsion Systems Market Overview

Space Propulsion Systems Market Size was valued at USD 6,666.45 Million in 2022. The Space Propulsion Systems market industry is projected to grow from USD 7,359.90 Million in 2023 to USD 19,776.80 Million by 2032, exhibiting a compound annual growth rate (CAGR) of 11.71% during the forecast period (2023 – 2032). Spacecraft propulsion systems are propellant for spacecraft in the vacuum of space. There are various propulsion systems such as chemical thrusters, electric propulsion, and ion thrusters. These systems are used depending on the mission requirements and efficiency considerations. The system is being widely used in Orbital satellites and spacecraft, interplanetary spacecraft and probes, Control of re-entry vehicles, ascent roll control and stabilization of light to heavy launch vehicles, and others.

Figure1: Space Propulsion Systems Market, 2019 - 2032 (USD Million)

Space Propulsion Systems Market, 2019 - 2032

Source: Secondary Research, Primary Research, MRFR Database, and Analyst Review

Space Propulsion Systems Market Driver

- **GROWING DEMAND FOR SATELLITE CONSTELLATIONS FOR COMMUNICATION SERVICES**

The growth of the market is driven by the growing demand from satellite constellations for communication services. The ever-increasing demand to increase network connectivity in rural and underserved areas have pushed companies to invest significantly in satellite networks. Satellite constellations are used as a better option as compared to geostationary satellite as they have broader coverage and low latency, this makes them more favourable choice for reaching remote locations.

Also, the growing proliferation of IoT devices and growing smart cities are creating substantial demand for network connectivity and high-speed data transmission which in turn has been driving the requirement for deployment of satellite constellations. Major market players such as SpaceX, OneWeb, and Amazon have been launching large constellations of satellites to enhance broadband internet services across the globe. All this has space propulsion systems. These propulsion systems help in positioning and maintaining orbits. All these factors have been creating favourable market conditions for the growth of the Space Propulsion Systems Market.

Space Propulsion Systems Market Type Segment Insights:

Space Propulsion Systems Type Insights

Based on type, the Space Propulsion Systems Market has been segmented into Solid Propulsion (Homogeneous and Heterogeneous/Composites), Cold Propulsion, Liquid Propulsion (Monopropellant and Bipropellant), Cryogenic Propulsion, Hybrid Propulsion, Green Propulsion, Electric Propulsion, Pulsed Plasma Propulsion, and Others. In 2022, among types, the solid propulsion segment held the most substantial market share, valued at USD 2103.90 million, and is projected to reach a market valuation of \$5,604.88 million by 2032, representing a robust CAGR of 10.50%.

Solid propulsion systems use solid propellants, which consist of fuel and oxidizer mixed in a solid form. Solid propulsion systems are further divided into homogeneous and heterogeneous/composites. Solid propulsion systems provide a high thrust-to-weight ratio and therefore are widely used as ballistic missiles, launch vehicles, and fireworks.

Cold propulsion systems are being used as a propellant owing to their ability to provide high specific impulse and controllability. They have wide applications in space exploration missions where efficiency and precision are required, such as satellite positioning and interplanetary travel.

Liquid propulsion systems are stored separately as fuel and oxidizer. They are then mixed in a combustion chamber to generate thrust. The segment also includes monopropellant systems, utilizing a single liquid as both fuel and oxidizer and bipropellant systems, having separate fuels and oxidizers. Liquid propulsion has benefits as they are more controllable and more efficient thus widely used in space missions, including satellite launches, orbital maneuvers, and deep space exploration.

Cryogenic propulsion systems are being used as propellants stored at extremely low temperatures, typically below -150°C (-238°F). It offers high performance owing to higher efficiency. In Cryogenic propulsion systems Liquid hydrogen and liquid oxygen are commonly used as cryogenic propellants, enabling significant impulse and efficient propulsion.

Hybrid propulsion systems combine elements of different propulsion technologies to achieve specific performance goals and are used in various space missions. Green propulsion systems use non-toxic propellants. The system prioritizes sustainability and safety without compromising performance. Electric propulsion systems use electrical energy to accelerate propellant particles to generate thrust and Pulsed plasma propulsion systems utilize plasma as a propellant, which is generated through rapid heating and expansion of a gas. These systems generate short bursts of high-energy plasma to produce thrust, offering high acceleration and efficiency. The others category includes nuclear thermal propulsion, solar sail propulsion, and beamed energy propulsion.

Space Propulsion Systems Market Application Segment Insights:

Space Propulsion Systems Application Insights

Based on Application, the Space Propulsion Systems Market has been segmented into Launchers, Space Tugs, Spacecraft/Satellites (<50kg, 50-500kg, 500-1000kg, and 1000-2500kg) and landers.

Launchers send payloads into space. They carry satellites and other payloads beyond Earth's atmosphere. Thus, launchers have wide applicability across the globe. Launchers are divided into various types such as expendable launch vehicles (ELVs) and reusable launch vehicles (RLVs). The growth of the segment is attributed to the growing investment in launchers by both private and public companies and increasing defense and space missions by governments across the region.

Space tugs help transport payloads within space. These propulsion systems transfer payloads from one orbit to another. They come in various propulsion technologies such as chemical, electric, and solar sail propulsion. The technology is used as per the requirement of the mission.

Spacecraft and satellites are categorized based on their mass, with classifications including small satellites (<50kg), medium-sized satellites (50-500kg), and large satellites (500-2500kg). Small satellites are compact, have low cost and are easily deployed. They are being used for Earth imaging, climate monitoring, and other purposes. On the other hand, Medium-sized and large satellites are used for specialized needs. Global positioning system (GPS) navigation, weather forecasting, and space science missions are some of the examples where medium sized satellites or large satellites are used.

Landers are spacecraft that help land the spacecraft safely on the surface. These systems are vital in planetary exploration missions as they help in delivering scientific instruments, rovers, or human payloads to conduct surface experiments and studies.

Figure2: Space Propulsion Systems Market, by Application, 2022 & 2032 (USD Million)

Space Propulsion Systems Market, by Application, 2022 & 2032

Source: Secondary Research, Primary Research, MRFR Database, and Analyst Review

Space Propulsion Systems Regional Insights

By Region, the study provides market insights into North America, Europe, Asia-Pacific, and the rest of the world.

In 2022, North America held the largest market share. North America accounted for 38.90% of the space propulsion systems market. The region is growing with a CAGR of 11.26%. It is anticipated that North America will continue its dominance over the forecast period. Asia-Pacific holds a 27.15% market share and is growing with a CAGR of 12.90%. The Rest of the World held 5.09% of the market in 2022. The region has been experiencing a steady CAGR of 12.52%.

The North American Space Propulsion System market holds the largest market share owing to the presence of large market players such as SpaceX, NASA, Blue Origin, and Aerojet Rocketdyne. Also, growing Commercial and government-backed space activities and missions in North America are propelling the market. For instance, SpaceX, Falcon rockets, and pioneering reusability concept have changed the dynamics of the market. Also, the growing demand from the North American market for space tourism, and exploratory missions has been driving the growth of the market.

Europe accounted for 28.86 % of the market in 2022, growing at a CAGR of 10.94%. The growth of

the market is driven by European countries such as France, Germany, and Italy. These countries have strong aerospace industries. This aerospace industries contributes significantly to the region's growth.

Furthermore, in the Asia-Pacific region countries such as China, India, Japan, and South Korea have made substantial progress in their space programs, driving the demand for advanced propulsion systems.

Figure3: SPACE PROPULSION SYSTEMS MARKET SIZE BY REGION 2022&2032

SPACE PROPULSION SYSTEMS MARKET SIZE BY REGION 2022&2032

Source: Secondary Research, Primary Research, MRFR Database, and Analyst Review

Space Propulsion Systems Key Market Players & Competitive Insights

The Space Propulsion Systems Market has the presence of many global, regional, and local vendors. Some of the Key Companies operating in the market are Northrop Grumman Corporation, Safran SA, Space Exploration Technologies Corp, Moog, Inc., IHI Corporation, Rafael Advanced Defense Systems Ltd. The market is competitive, with all the players competing to gain maximum market share. Intense competition, frequent changes in government policies, and regulations are key factors that impact market growth. The vendors compete based on cost, product quality, reliability, and aftermarket services. The vendors must provide cost-efficient and high-quality space propulsion systems to sustain their presence in an intensely competitive market environment.

Key Companies in the Space Propulsion Systems market include.

- Safran SA
- IHI Corporation
- Space Exploration Technologies Corp
- Northrop Grumman Corporation
- L3Harris Technologies, Inc.
- Moog, Inc.
- Rafael Advanced Defense Systems Ltd.
- OHB SE
- Lockheed Martin Corporation
- NPO Energomash
- Sierra Nevada Corporation
- Thales Group
- Eaton
- VACCO Industries
- Arianegroup
- Airbus SE.

Space Propulsion Systems Industry Developments

- July 2023 Lockheed Martin won a contract from the Defense Advanced Research Projects Agency (DARPA) to develop and demonstrate a nuclear-powered spacecraft under a project called Demonstration Rocket for Agile Cislunar Operations (DRACO).
- June 2023 Sweden AB, a subsidiary of OHB SE, and Thales Alenia Space have signed contracts for the design, manufacturing, integration, testing and delivery of a propulsion subsystem for the two ESA/EU Copernicus missions CHIME and ROSE-L.
- July 2023 Safran Electronics & Defense and Terran Orbital have partnered to study and validate the prerequisites to produce an electric propulsion system for satellites in the United States, based on Safran's PPSX00 plasma thruster.
- March 2023 IHI Corporation and Northrop Grumman have

collaborated at DSEI Japan to work towards developing small, highly manoeuvrable satellites and other solutions for missions such as Space Domain Awareness (SDA) for Japan.

Space Propulsion Systems Market Segmentation :

Space Propulsion Systems Market, By Type Outlook

- Solid Propulsion
 - Homogeneous
 - Heterogeneous/Composites
- Cold Propulsion
- Liquid Propulsion
 - Monopropellant
 - Bipropellant
- Cryogenic Propulsion
- Hybrid Propulsion
- Green Propulsion
- Electric Propulsion
- Pulsed Plasma Propulsion
- Others

Space Propulsion Systems Market, By Application Outlook

- Launchers
- Space Tugs

Spacecraft/Satellites

- <50kg
- 50-50kg
- 500-1000kg
- 1000-2500kg
- Landers

Space Propulsion Systems Market, By Orbit Type Outlook

- LEO
- MEO
- GEO
- Beyond Geosynchronous Orbit

Space Propulsion Systems Market, By End-Users Outlook

- Government & Defense
- Commercial

Space Propulsion Systems Regional Outlook

- North America
 - US
 - Canada
- Europe
 - Germany
 - France
 - UK
 - Italy
 - Spain
 - Belgium
 - Netherlands
 - Russia
 - Rest of Europe
- Asia-Pacific
 - China
 - Japan
 - India
 - Australia
 - South Korea
 - Rest of Asia Pacific
- Rest of the world
 - Saudi Arabia
 - UAE
 - South Africa
 - Rest of the world

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