

Terminal Automation Market Report by Offering (Hardware, Software and Services), Project Type (Brownfield Projects, Greenfield Projects), Vertical (Oil and Gas, Chemical, and Others), and Region 2024-2032

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Abstracts

The global terminal automation market size reached US\$ 6.2 Billion in 2023. Looking forward, IMARC Group expects the market to reach US\$ 9.4 Billion by 2032, exhibiting a growth rate (CAGR) of 4.5% during 2024-2032. The market is chiefly driven by the rising adoption of advanced software solutions, heightened integration of IoT technology, and significant digital transformations. Moreover, enhanced cybersecurity measures are ensuring the safety of sensitive data and retaining integrity of automated operations.

Terminal Automation Market Analysis:

Major Market Drivers: Some of the major market drivers of terminal automation include the escalating demand for improved cybersecurity, technological advancements in artificial intelligence (AI) and the internet of things (IoT) solutions, and bolstering need for cost-efficient and optimized operations. Furthermore, automated solutions are currently expected to handle higher capacities due to proliferation of port infrastructure and boost in global trade volumes. The adoption of automation is further heightened by sustainability trend and regulatory policies that emphasizes on reduced energy consumption and carbon emissions.

Key Market Trends: The key trends in terminal automation market size include increased utilization of cloud-based software solutions that offer flexibility as well

as scalability, and heightening incorporation of AI and IoT technologies that facilitate real-time monitoring and improved operational efficiency. Additionally, rising emphasis on cybersecurity is another key trend for the market as it is essential to secure data integrity from cyber threats, which are common in automated systems. Moreover, intensifying inclination towards sustainability has expanded the terminal automation market due to its reduced emissions and energy utilization.

Geographical Trends: Latin America and Asia-Pacific have shown substantial growth in the global market for terminal automation primarily due to rapid infrastructure development and magnified industrialization. Europe and North America are persistently investing in advanced automation technologies to sustain competitiveness and improve operational efficiency. Middle East region is currently leveraging terminal automation to expand its trade volumes. Consequently, a global shift can be observed towards adoption of automation in order to meet increased sustainability and efficiency demand.

Competitive Landscape: Some of the major market players in the terminal automation industry include ABB Ltd, Emerson Electric Co., Endress+Hauser AG, General Electric Company, Honeywell Process Solutions (Honeywell Automation and Control Solutions), Larsen & Toubro Limited, Rockwell Automation Inc., Schneider Electric SE, Siemens Aktiengesellschaft, TechnipFMC Plc and Yokogawa Electric Corporation.

Challenges and Opportunities: Major challenges in the terminal automation market trends involve cybersecurity threats, elevated initial investment costs, and sophisticated integration methods. Nevertheless, these challenges pave numerous opportunities, including advancements in IoT and AI technology for smooth integration, development of cost-effective solutions, and improved cybersecurity systems to safeguard automated systems. In addition, the escalating demand for enhanced operational efficiency, sustainability methods, and regulatory policies boosts both growth and innovation, prompting a dynamic landscape for the market.

Terminal Automation Market Trends:

Increasing IoT Integration and Digital Transformation

Terminal automation market is significantly driven by ongoing digital transformation and increased integration of IoT technology, which can potentially enhance control capabilities and real-time monitoring. IoT integrated sensors and devices can collect and analyze data in a continuous pattern. This enables optimization of operation efficiency, safety improvement, and predictive maintenance. For instance, PSA Tuas Port is expected to become the world's largest automated container terminal with integrated automation technology, including automated guided vehicles (AGV). This port will achieve full operational capacity by 2040. Marking the digital transformation in the sector, data analytics, AI, and robotics will also be implemented by the port.

Rapid Adoption of Advanced Software Solutions

Terminal automation market is rapidly adopting advanced software, such as AI-based analytics and cloud-based systems, which makes the operations management flexible and easier, ultimately propelling the market expansion. For instance, in September 2023, Community Network Services designed a cloud-based software solution to future-proof and improve port technology called CNS Port Community System (PCS). This advanced software is built on CARGOES platform and is efficient in working on multiple devices. The aim of this software is to improve cargo visibility, communication, trade efficiency. Enhanced decision-making and data processing properties are chief benefits driving this trend.

Enhanced Cybersecurity Protocols

Cybersecurity has become a cardinal issue in terminal automation as the reliance on automated and digital systems is intensifying rapidly. The deployment of potent cybersecurity protocols is critical to safeguard sensitive and crucial data and maintain automated operations integrity. As per the data by World Economic Forum, around 2200 cyberattacks are reported each day, totaling to 800,000 attacks annually. Furthermore, it is expected that global cost of cybercrime will surge to USD 23.84 trillion by 2027. Consequently, major companies are rapidly making investments in cybersecurity technologies to protect automated terminals from cyber-attacks. For instance, in September 2023, Kalmar became the first port and terminal industry solution provider to be granted Cyber Security Certificate for its automation system, named Kalmar One Automation System, across all terminal equipment.

Terminal Automation Market Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the market,

along with forecasts at the global, regional, and country levels for 2024-2032. Our report has categorized the market based on offering, project type, and vertical.

Breakup by Offering:

Hardware

Control Systems

Security Systems

Field Devices

Trucks and Pipelines

Others

Software and Services

The report has provided a detailed breakup and analysis of the market based on the offering. This includes hardware (control systems, security systems, field devices, trucks and pipelines and others), and software and services.

Hardware includes RFID systems, automated vehicles and cranes, etc. Control systems in terminal automation enhance efficiency and reduce manual errors by integrating and controlling various operations. The demand for real-time data and operational transparency, along with advancements in IoT and AI, drive the adoption of these systems. Security systems protect terminals from unauthorized access and cyber threats, with increasing emphasis on safety and compliance in the oil and gas industry. Field devices, including sensors and actuators, provide accurate data for real-time decision-making, enhancing operational efficiency. Automation of trucks and pipelines ensures safe and efficient material transportation, driven by the need for integrated logistics. For instance, in March 2024, PSA Sines launched a fully automated rubber-tired gantry cranes (aRTGs), which are expected to reduce carbon emissions by 50%.

Software and services in terminal automation encompass a range of solutions, including cloud-based platforms and terminal operating systems (TOS) that provide real-time data analytics and optimized operational solutions. These systems enable enhanced

efficiency and decision-making. Additionally, the implementation of such advanced software solutions necessitates robust cybersecurity measures to protect against potential threats and vulnerabilities. Regular maintenance services are also essential to ensure the seamless performance and longevity of these automated systems, safeguarding the overall integrity and functionality of terminal operations. For instance, Intech provides smart TOS that is portable, scalable, and flexible. It supports features like graphical berth view, tidal charts for draft calculation, multiple terminal support, etc.

Breakup by Project Type:

Brownfield Projects

Greenfield Projects

A detailed breakup and analysis of the market based on the project type have also been provided in the report. This includes brownfield projects, and greenfield projects.

The terminal automation market for brownfield projects is driven by the need to upgrade and modernize existing infrastructure to enhance operational efficiency and safety. Aging terminals require the integration of advanced automation solutions to optimize processes, reduce manual intervention, and minimize errors. Regulatory compliance and the need to adhere to stringent safety and environmental standards also push for automation in brownfield projects. Moreover, the increasing demand for real-time data and analytics in managing terminal operations is a significant driver, enabling better decision-making and resource management. Cost-effectiveness and minimizing downtime during upgrades further fuel the adoption of automation technologies in existing facilities. For instance, HHLA Container Terminal Burchardkai (CTB), the oldest and largest container terminal in Hamburg has undergone transformation that modernized and upgraded the existing facility and enhanced its efficiency and capacity. It can now handle larger ships and address yard capacity limitations.

On the other hand, greenfield projects in the terminal automation market are primarily driven by the desire to build state-of-the-art facilities from the ground up, incorporating the latest technological advancements. The focus on creating highly efficient, scalable, and future-proof terminals encourages the implementation of cutting-edge automation solutions. The rising demand for energy and commodities necessitates the development of new terminals to meet global supply chain needs, thus driving the market. Environmental considerations and sustainability goals also play a crucial role, with new

projects aiming to minimize carbon footprints and enhance operational sustainability through automation. Additionally, government incentives and favorable policies for new infrastructure developments significantly boost the greenfield segment of terminal automation.

Breakup by Vertical:

Oil and Gas

Chemical

Others

The report has provided a detailed breakup and analysis of the market based on the vertical. This includes oil and gas, chemical, and others.

The oil and gas sector is a major driver for the terminal automation market due to the need for enhanced operational efficiency, safety, and compliance with stringent environmental regulations. Automation technologies in this vertical help in streamlining the management of large volumes of oil and gas, improving accuracy in inventory control, and reducing the risk of human error. With the increasing demand for energy and the complexity of global supply chains, automated systems provide real-time monitoring and control, ensuring optimal performance and minimizing downtime. Additionally, the integration of advanced analytics and IoT technologies enhances predictive maintenance and operational insights, further driving the adoption of automation in this sector. For instance, in March 2023, ABB India delivered automation and control solution for the 130-kilometer Indo-Bangla Friendship Pipeline (IBFPL), which will transport diesel from India to Bangladesh. This cross-border pipeline has a capacity of 1 million tonnes per annum (MMTPA) and is expected to significantly enhance Bangladesh's energy access. The technology from ABB India enables Numaligarh Refinery (NRL) to remotely monitor and control key pipeline parameters such as flow, pressure, and temperature, as well as detect leaks.

In the chemical industry, terminal automation is driven by the necessity for precise handling and management of hazardous materials, ensuring both safety and compliance with industry standards. Automated systems help in maintaining accurate records of chemical quantities, enhancing traceability, and preventing contamination through controlled environments. The complexity of chemical processes requires

advanced automation solutions to optimize production, improve quality control, and reduce operational costs. As the industry moves towards more sustainable practices, automation enables efficient resource management and minimizes environmental impact, making it a crucial component in modern chemical manufacturing and distribution.

Breakup by Region:

North America

United States

Canada

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Others

Europe

Germany

France

United Kingdom

Italy

Spain

Russia

Others

Latin America

Brazil

Mexico

Others

Middle East and Africa

The report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa.

The North American terminal automation market is driven by the region's advanced technological infrastructure and the growing need for operational efficiency and safety in the oil and gas industry. The stringent regulatory environment ensures compliance with safety standards, pushing companies to adopt advanced automation solutions. Additionally, the presence of major market players and continuous investments in research and development contribute to the market growth. The increasing focus on energy security and the development of smart terminals further enhance the demand for automation. Finally, the rising adoption of Internet of Things (IoT) and Industrial Internet of Things (IIoT) technologies drives innovation in terminal automation systems.

In Europe, the terminal automation market is propelled by stringent environmental regulations and the EU's strong emphasis on sustainable and efficient energy practices. The region's commitment to reducing carbon emissions and enhancing energy efficiency encourages the adoption of automated solutions in terminals. The robust industrial base, particularly in countries like Germany and the UK, demands advanced

automation for improved productivity and safety. Additionally, the modernization of aging infrastructure and the integration of digital technologies like AI and big data analytics are key drivers.

For instance, in June 2024, APM Terminals invested in Europe and North America terminals that include electric terminal tractors, rubber tyred gantry cranes, and some other terminal equipment. Investment strategy included agreement with ZPMC that will deliver automated rail mounted gantry cranes in Mexico and ship-to-shore cranes in Netherlands.

The Asia Pacific terminal automation market is experiencing rapid growth due to the expanding oil and gas industry and the significant investments in infrastructure development across countries like China and India. The region's fast-paced industrialization and urbanization increase the demand for efficient and safe terminal operations. According to International Monetary Fund, economic expansion of Asia-Pacific region accelerated to 4.6% in 2023. Government initiatives to enhance energy security and infrastructure modernization contribute to market expansion. Additionally, the rising adoption of advanced technologies such as IoT and cloud computing in industrial operations drives the implementation of automation solutions. The increasing foreign investments and collaborations in the energy sector further bolster the market.

In Latin America, the terminal automation market is driven by the need to improve operational efficiency and safety in the burgeoning oil and gas sector. The region's abundant natural resources and increasing exploration activities necessitate advanced automation solutions to enhance productivity and reduce operational risks. Government initiatives to attract foreign investments and modernize the energy infrastructure contribute to market growth. Additionally, the adoption of digital technologies and automation in various industrial processes supports the demand for terminal automation. The growing focus on sustainable energy practices and the development of new terminals also propel the market forward.

The terminal automation market in the Middle East and Africa is fueled by the region's extensive oil and gas reserves and the ongoing efforts to enhance energy infrastructure. The need for efficient and safe terminal operations in the face of high production volumes drives the adoption of automation solutions. Government investments in infrastructure development and modernization projects play a significant role in market expansion. Additionally, the increasing adoption of advanced technologies like IoT, AI, and big data analytics in industrial operations enhances the demand for terminal automation. The region's strategic focus on diversifying the economy and improving

energy security further supports market growth.

Competitive Landscape:

The market research report has also provided a comprehensive analysis of the competitive landscape in the market. Detailed profiles of all major companies have also been provided. Some of the major market players in the terminal automation industry include ABB Ltd, Emerson Electric Co., Endress+Hauser AG, General Electric Company, Honeywell Process Solutions (Honeywell Automation and Control Solutions), Larsen & Toubro Limited, Rockwell Automation Inc., Schneider Electric SE, Siemens Aktiengesellschaft, TechnipFMC Plc and Yokogawa Electric Corporation.

(Please note that this is only a partial list of the key players, and the complete list is provided in the report.)

The competitive landscape of the global terminal automation market is represented by intense contest among major companies that are leading in innovations to sustain their market value. Such companies are strongly emphasizing on acquisitions and partnerships for the expansion of their market presence. For instance, in March 2024, APM Terminals and HHIT signed a MoU for efficient and sustainable port automation and green logistics in North Vietnam. In addition, new companies are utilizing IoT and AI systems that play a pivotal role in market dynamics. Ongoing research and development of automation technologies are further intensifying the competition.

Terminal Automation Market News:

In August 2023, Evergreen Marine Corp., in cooperation with Taiwan International Ports Corporation, launched Terminal 7 at Kaohsiung Port, Taiwan's first fully-automated container terminal. This terminal is equipped with remote-controlled gantry cranes, 5 berths, etc., that will facilitate the handling of ultra-large container ships.

In July 2024, OPW Engineered Systems announced the launch of a new 8800 Series Overfill and Ground Monitoring System. It is an advanced solution for terminal operators who seek to make the filling processes more intuitive and

safer. This series is incorporated with advanced features that can be easily integrated into existing terminal automation systems. It includes LED lights and pictograms that can rapidly communicate the loading status, irrespective of language.

Key Questions Answered in This Report:

How has the global terminal automation market performed so far, and how will it perform in the coming years?

What are the drivers, restraints, and opportunities in the global terminal automation market?

What is the impact of each driver, restraint, and opportunity on the global terminal automation market?

What are the key regional markets?

Which countries represent the most attractive terminal automation market?

What is the breakup of the market based on the offering?

Which is the most attractive offering in the terminal automation market?

What is the breakup of the market based on the project type?

Which is the most attractive project type in the terminal automation market?

What is the breakup of the market based on the vertical?

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What is the competitive structure of the market?

Who are the key players/companies in the global terminal automation market?

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