Global Cleanroom Technology Market: Analysis By Product (Consumable & Equipment), By Construction Type (Standard, Hardwall, Softwall & Pass-through Cabinets), By End User (Pharmaceutical Industry, Biotechnology Industry, Medical Device Manufacturers, Hospitals and Others), By Region Size and Trends with Impact of COVID-19 and Forecast up to 2028

https://marketpublishers.com/r/GA00170989D0EN.html
Date: February 2023
Pages: 174
Price: US$ 2,450.00 (Single User License)
ID: GA00170989D0EN

Abstracts

The global cleanroom technology market was valued at US$4.78 billion in 2022 and is expected to be worth US$6.92 billion in 2028. ‘ISO 1464 41-1’ defines a clean area as a specified area in which the concentration of airborne particles is regulated and classified, and which has been appropriately designed and is being operated for regulating the introduction, formation, and deposition of particles in the area.

A cleanroom is a controlled environment in which pollutants such as dust, airborne microbes, and aerosol particles are filtered out to provide the cleanest possible environment. The majority of cleanrooms are used to manufacture products such as pharmaceuticals, and medical equipment. Thus, cleanroom technology encompasses all technical and operational measures aimed at reducing the risk of product contamination. Cleanrooms can be filtered by HEPA (High Efficiency Particulate Air) air handling units, and temperature is used in some cleanrooms to reduce microbial growth such as viruses, spores, fungi, and bacteria. With the improvement of individual wealth, consumers start to pay more attention to personal health which leads to increasing demand for pharmaceuticals, hospitals, and medical devices and drives the demand of cleanroom as well. The market is expected to grow at a CAGR of 6.38% over the

projected period of 2023-2028.

Market Segmentation Analysis:

By Product: The report identifies two segments on the basis of product: Consumable and Equipment. The cleanroom consumable segment dominated the market in 2022. Cleanroom consumables are either reusable or disposable and are frequently used in production capacities in a variety of end-use sectors, including pharmaceutical companies, biotech companies, hospitals, and diagnostic centers. Other key reasons for the segment's growth include bulk purchases by manufacturing companies, high demand for preventing contamination by personnel, convenience, and various alternatives developed by key players.

By Construction Type: The report identifies four segments on the basis of construction type: Standard, Hardwall, Softwall & Pass-Through Cabinets. The hardwall cleanroom technology segment is expected to be the fastest growing segnment during the forecasted period. Hardwall cleanrooms are permanent structures that are constructed using hard, durable materials such as metal or plastic. These cleanrooms provide a high level of control over the environment and are typically used in applications that require a high degree of cleanliness and control. Hardwall cleanrooms can be designed to meet specific cleanliness levels and can be used for a wide range of applications, including research and development, manufacturing, and testing. Customization is available for hardwall cleanrooms. The cleanroom panels can be installed almost anywhere and are fully customizable to the application and location. The cleanroom components are manufactured offsite (prefabricate) and easily assembled once delivered. These factors are expected to support the segment’s growth.

By End User: The report identifies five segments on the basis of end user: Pharmaceutical Industry, Biotechnology Industry, Medical Device Manufacturers, Hospitals and Other End Users. Pharmaceutical industry held the highest share in the market in 2022. The increase is due to stringent regulations governing pharmaceutical product approval, which has resulted in an increase in demand for cleanroom technology. Air with low particulate matter is required for pharmaceutical production. The installation of cleanroom technology equipment, such as HVAC, air showers, and air diffusers, ensures the highest product quality with the least amount of waste, maximizes yield, and optimizes the manufacturing process. Because of the aforementioned factors, the use of cleanroom technology in the pharmaceutical industry has increased, indicating a high growth potential.

By Region: In the report, the global cleanroom technology market is divided into five regions: North America, Europe, Asia Pacific, Middle East & Africa and Latin America. North America accounted for the maximum share of the global market in 2022. This can be attributed to the region's well-established healthcare infrastructure, the presence of key pharmaceutical and medical device companies in the region, an increase in the burden of noncommunicable diseases, and increased awareness of cosmeceuticals and nutraceuticals. Furthermore, strict regulations governing the approval of healthcare products in this region, such as the US, have increased demand for cleanroom technology.

However, the market in Asia Pacific is expected to grow rapidly over the forecast period. Investment in healthcare development is also increasing in this region. The increase in generic drug production due to branded drug patent expirations, growing geriatric population, and increasing burden of noncommunicable diseases are the major factors driving the growth of the pharmaceutical industry in Asia Pacific, thereby attributing to the growth of the cleanroom technology market.

Market Dynamics:

Growth Drivers: One of the key drivers of the market's expansion is the growth in biopharmaceuticals industry. The biopharmaceutical sector has been growing rapidly in recent years, and this growth is driving the demand for cleanroom technology. Cleanroom technology is essential in the biopharmaceutical industry to maintain a controlled and contaminated-free environment during the production and development of biopharmaceutical products. In the biopharmaceutical industry, cleanrooms are used to prevent contamination of sensitive biological materials, such as proteins, viruses, and cells, during production and research.

Cleanrooms also help prevent contamination of biopharmaceutical products during the packaging and storage stages. As the biopharmaceutical sector continues to grow, the demand for cleanrooms and cleanroom technology also increases, leading to growth in the cleanroom technology market. Other significant growth factors of the market include increasing prevalence of infectious diseases, increasing demand from hospitals & ambulatory surgery centers, increasing demand for sterile products, stringent regulations in end use industries and advancement in cleanroom technology.

Challenges: However, some challenges are impeding the growth of the market such as high costs associated with cleanrooms and need for specialized personnel. One of the major challenges facing the cleanroom technology market is the high cost associated with the development, design, and maintenance of cleanroom facilities. Cleanroom technology is a complex system that involves several components such as filtration systems, air handling units, laminar flow workstations, gowning systems, and flooring systems. Each of these components is critical to maintaining the controlled environment of a cleanroom and requires specialized materials, equipment, and personnel to be installed, operated, and maintained. This specialization and complexity drive up the cost of cleanroom technology, making it challenging for companies, especially smaller ones, to invest in these systems. The high costs associated with cleanroom technology can limit its adoption, particularly in small-scale operations, and could potentially impede growth in the cleanroom technology market.

Trends: The market is projected to grow at a fast pace during the forecast period, due to integration of artificial intelligence in cleanroom technology, advancements in filtration technologies in cleanrooms and customized cleanrooms. Customized cleanrooms are a growing trend in the cleanroom technology market due to the increasing demand for specialized and tailored environments that meet specific needs. The trend towards customization has been driven by advancements in cleanroom design and construction, making it easier and more cost-effective to create cleanrooms that are tailored to meet specific needs. Customized cleanrooms are designed to meet the specific requirements of a particular industry or application, whether it is pharmaceutical, biotech, electronics, or another industry. By customizing cleanrooms, companies can achieve a higher level of control over their production processes and reduce the risk of contamination, leading to improved product quality and reduced costs.

Impact Analysis of COVID-19 and Way Forward:

In the initial stages of the pandemic, the spread of the virus led to a slowdown in demand for cleanroom technology as construction and production activities decreased globally. The lockdowns and social distancing measures put in place to control the spread of the virus disrupted the supply chain, leading to delays and disruptions in the delivery of cleanroom products and services.

However, as the pandemic continued, the need for clean and controlled environments for essential and pharmaceutical industries increased during the second half of 2020. The pandemic highlighted the importance of cleanroom technology in preventing the spread of infectious diseases and protecting public health. This increased demand for cleanroom technology has driven growth in the market. The pharmaceutical and biotech industries, in particular, have seen a surge in demand for cleanroom technology as they ramp up production of COVID-19 vaccines and treatments, thus driving the market upwards in 2020. Moreover, the pandemic has caused a massive demand for personal protective equipment (PPE), including face masks, gloves, gowns, and eye protection. This has had a significant impact on the cleanroom technology market.

The post-COVID environment also appears to be fortunate for the market. The cleanroom technology market is expected to benefit from the trend towards automation and digitalization, as companies look to improve efficiency and reduce costs. Automated systems and digital technologies, such as sensors, control systems, and data analysis software, are becoming increasingly common in cleanrooms, and this trend is expected to continue in the post-COVID era.

Competitive Landscape:

Global cleanroom technology market is fragmented in nature, with increasing acquisitions, collaboration, and product launches. Additionally, the companies are also investing in research and development activities to improve the efficiency and effectiveness of their products and services. For instance, Ardmac welcomed Cental to the Ardmac Group in June 2022. Ardmac's ongoing agreement with the US-based Germfree Laboratories to provide prefabricated turnkey modular cleanrooms and biosafety laboratories to the BioPharma and Healthcare sectors throughout Europe would be supported by Cental's manufacturing capability.

The key players in the global cleanroom technology market are:

- Azbil Corporation
- DuPont de Nemours, Inc.
- Exyte Group
- Kimberly-Clark Corporation
- Taikisha Ltd.
- Labconco Corporation
- Ardmac Ltd.
- Abtech, Inc.

Berkshire Corporation

Clean Rooms International, Inc.

Terra Universal Inc

Clean Air Products Inc.

In recent years, the market has witnessed an increase in the number of new entrants, particularly from Asia-Pacific, which has added to the competitive intensity in the market. As a result, established players are focusing on maintaining their market position through continuous improvement of their products and services and by expanding their geographical reach.?

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